

ANDOVER

High School Feasibility Study Andover Public Schools Town of Andover, Massachusetts May 22, 2014



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Introduction

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1 Introduction

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Executive Summary

The full recommendations of this feasibility study are explained in greater detail in Chapter 4. This summary is focused on providing the PROJECT COST for the recommendations, which is composed of the construction cost plus soft costs.

Construction cost (“hard costs”) includes construction costs, contractor’s general overhead and profit, project general conditions, bonds, and an estimating design contingency. Project “soft costs” are those project related costs beyond “brick and mortar”. These “soft costs” include, but are not limited to legal fees, technology, design fees, furniture-fixtures-&-equipment, construction contingency, site surveys, borings, geotechnical studies, testing, inspections, independent structural reviews, telephone, and security systems. The “hard costs” and the “soft costs” taken together form the total PROJECT COST for a project scope of work.

The recommended Classroom addition is titled the "Base Option," and includes a new three-story wing located adjacent to the existing Science wing, adding 15 classrooms to the High School.

Classroom Sitework	\$725,000
Classroom Addition	\$9,614,000
Renovation for new means of egress	\$100,000
Sprinkler at Existing School	\$2,419,000
Asbestos Abatement Allowance	\$100,000
<u>Soft Costs</u>	<u>\$3,240,000</u>
Total for Base Option	\$16,198,000

The recommended Kitchen & Cafeteria project includes renovations to the kitchen, a "food court" type serving area, and expansion of the seating capacity in the dining room.

Kitchen & Cafeteria Construction Cost	\$5,492,000
<u>Soft Costs</u>	<u>\$1,373,000</u>
Kitchen & Cafeteria Project Cost	\$6,865,000

*(Sprinklers throughout the school **may** be required by this work, but that cost is not included in this total.)*

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The recommended Media Center project includes renovations within the existing space to create a 21st century Digital Commons.

Media Center Renovations	\$1,741,000
<u>Soft Costs</u>	<u>\$435,000</u>
Media Center Project Cost	\$2,176,000

The recommended project within the Collins Center for the Performing Arts adds an operable partition around a portion of the seats to create a lecture hall.

Auditorium Operable Partition	\$269,000
<u>Soft Costs</u>	<u>\$67,000</u>
Auditorium Operable Partition Project Cost	\$336,000

Goals of Study

Andover High School is the focus of this study. (Evaluation of the Shawsheen Elementary School will be performed after the High School study.)

Evaluate the short and long term space needs at Andover High School, providing recommendations and conceptual design for the proposed solutions.

Create options for additional classrooms to accommodate a total enrollment of 1900 students.

Redesign the current Library/Media Center into a more flexible space to support current and future learning approaches.

Create additional seating capacity in the Cafeteria, and improve the kitchen equipment and serving line area.

Allocate additional classrooms and offices for the anticipated increase in Special Education student enrollment.

Study Process

Drummey Rosane Anderson (DRA) began working on this study in December, 2013. The Town of Andover requested that the study provide a scope for the recommended option in time to include an item on the Town Meeting warrant. The deadline for the warrant was February, 2014.

DRA's study team of consultants, architects, and engineers visited the building, met with people in the school and in town, generated plans and planning options with sufficient detail for a conceptual estimate to be generated for each alternative. At this point in the feasibility study, the proposed plans are "fit" diagrams rather than

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designs, but the scope of the potential project has been determined so that the proposal can proceed to the next step, the approval of funding at Andover's Town Meeting.

Study Team

Architect

Drummey Rosane Anderson, Inc. (DRA)
235 Bear Hill Road
Waltham, MA 02451
(617) 964-1700

Website: www.draarchitects.com

Mechanical Electrical Plumbing (MEP) Engineer

Consulting Engineering Services, LLC (CES)

Structural Engineer

Engineers Design Group, Inc. (EDG)

Landscape Architect

Warner Larson Inc.

Civil Engineer & Environmental Permitting

Linden Engineering Partners, LLC

Furniture, Fixtures & Equipment, Food Service, Laboratory

Tavares Design Associates

Code

R.W. Sullivan Engineering

Hazardous Materials

CDW Consultants, Inc.

Cost Estimating

A.M. Fogarty & Associates, Inc.

Acknowledgements

DRA appreciates the contributions of members of the Andover community in this study effort, including public officials, administrators, faculty, employees, and interested citizens.

2

Existing Conditions

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Existing Conditions

2.1 Introduction

Andover High School is a three-story concrete-framed building built in the 60's, with multiple additions, the latest of which was steel-framed and built in 1998. The total area of the building is 330,000 square feet. The high school is located on a 87+ acre site that it shares with West Middle School.

Each of the experts on the study team surveyed the building from the viewpoint of their area of expertise, and produced a report which is summarized here in Chapter 2, and included in whole in the Appendix.

2.2 Existing Building Code Report, R.W. Sullivan Engineering

The existing building was evaluated in light of the following applicable codes:

- Building: 780 CMR: Massachusetts State Building Code, 8th Edition
- Fire Prevention: 527 CMR: Massachusetts Fire Protection Regulations
- Accessibility: 521 CMR: Massachusetts Architectural Access Board Regulations
- Electrical: 527 CMR: Massachusetts Electrical Code
- Mechanical: 2009 International Mechanical Code
- Plumbing: 248 CMR: Massachusetts Plumbing Code
- Energy Conservation: 2009 International Energy Conservation Code

The full report from R.W. Sullivan is included in the Appendix, Section 5.1, but key findings are summarized here:

- The building 's Occupancy Classification is E (Educational) and A-3 (Gymnasium and Auditorium).
- The main building is Type IB (non-combustible, 2-hour rated), so the proposed addition to the Cafeteria is not limited in size.
- The part of the building containing the Science department is rated Type IIB (non-combustible, no rating), so the proposed addition there (including sprinkler and frontage increases) is allowed up to 3 stories (75 ft) in height, and up to 47,125 square feet in area.
- Any new passenger elevator in the additions must be sized to accommodate an ambulance gurney or stretcher.
- Automatic sprinkler systems are required throughout the building (MGL c. 148 s. 26G), if there is an addition, or if the renovations are considered "major."

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2.3 Existing Building Structural Assessment, Engineers Design Group, Inc.

The original school is essentially a three story concrete structure. Since its original construction, two major additions have been constructed. The additions are essentially concrete slab on metal deck floors with steel framing.

Based on our observations, the school is functioning adequately.

We observed minor cracks in the exterior facade in various locations. We observed that some of the brick had stained or discolored from the adsorption of water over time.

We did not observe any signs of foundation settlement; nor did we observe any excessive vibration on the supported floors due to footfall. We observed small cracks in the exterior concrete foundation walls, interior masonry walls, and concrete slabs on grade at various locations, these cracks do not appear to be a structural concern.

FEASIBILITY OF RENOVATION AND EXPANSION OF THE STRUCTURE

Depending on the scope of the renovations to the school, it may be feasible to make modifications to the existing structure without requiring full compliance with the code requirements for new construction. We would recommend that any additions, if planned, be separated from the existing structure by way of expansion joints.

PRIMARY STRUCTURAL CODE ISSUES RELATED TO THE EXISTING STRUCTURE

If any repairs, renovations, additions or change of occupancy or use are made to the existing structures, a check for compliance with 780 CMR, Chapter 34 “Existing Structures” (Massachusetts Amendments to The International Existing Building Code 2009) of the Massachusetts Amendments to the International Building Code 2009 (IBC 2009) and reference code “International Existing Building Code 2009” (IEBC 2009) is required. The intent of the IEBC and the related Massachusetts Amendments to IEBC is to provide alternative approaches to alterations, repairs, additions and/or a change of occupancy or use without requiring full compliance with the code requirements for new construction.

The IEBC provides three compliance methods for the repair, alteration, change of use or additions to an existing structure. Compliance is required with only one of the three compliance alternatives. Once the compliance alternative is selected, the project will have to comply with all requirements of that particular method. The requirements from the three compliance alternatives cannot be applied in combination with each other.

The three compliance methods are as follows:

1. Prescription Compliance Method.

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2. Work Area Compliance Method.
3. Performance Compliance Method.

Comment

The approach is to evaluate the compliance requirements for each of the three methods and select the method that would yield the most cost effective solution for the structural scope of the project. The selection of the compliance method may have to be re-evaluated after the impact of the selected method is understood and after analyzing the compliance requirements of the other disciplines, Architectural, Mechanical, Fire Protection, Electrical and Plumbing. Since the existing buildings are un-reinforced masonry wall structures, the analysis and reinforcement of the existing structures would be governed by the requirements of Appendix A1 “Seismic Strengthening Provisions for Un-reinforced Masonry Bearing Wall Buildings” in the IEBC.

(Please refer to the full document in the Appendix to this report for a detailed comparison of the three methods, and the impact they would have on the proposed project.)

Based on the structural characteristics of the proposed work, we would recommend the Work Area Compliance Method for the project.

SUMMARY

The existing school structure appears to be performing adequately. The majority of the structural components that are visible appear to be in sound condition. The half-height masonry walls in the basement do not extend to the underside of structure above. These walls will have to be adequately braced or reconstructed. If the proposed renovations are minimal, it is likely that no structural upgrades will be required for the existing structure; however if the proposed renovations are extensive in scale, the structure may have to be upgraded to meet the requirements of the code for new construction. This may require addition of some shear walls, connecting the floor and roof diaphragms to the existing masonry walls, clipping of non-structural masonry walls to the structure. All of the existing masonry walls would have to be adequately connected to the roof and floor structure.

(The Appendix, Section 5.2, also contains detailed structural recommendations for each of the three options for additions.)

2.4 Existing Mechanical, Electrical, Plumbing, & Fire Protection, Consulting Engineering Services, LLC

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Consulting Engineering Services (CES) produced a "Basis of Design" report which combines existing conditions with proposed work. The complete report is available in the Appendix, Section 5.3, and references to existing conditions are summarized here.

Fire Protection

The entire building will be provided with a fire sprinkler system, in accordance with the state code. In the 1994 expansion, approximately 60 % of the facility was provided with a fire sprinkler system.

Plumbing Systems

No additions to the plumbing system are anticipated in the media center or the cafeteria expansion. The existing kitchen and new serving line will be provided with new kitchen equipment. The plumbing systems in this area will be reconfigured as necessary, and the new equipment will be connected to existing mains. Major trenching will be required for new floor sinks and drains.

Plumbing systems in the new additions will be connected back to mains within the existing building.

HVAC (Heating, Ventilation, Air Conditioning)

In the Media Center, the existing split system d/x unit is sufficient to accommodate the renovation, even with the addition of skylights and/or monitor windows. No changes to the existing HVAC system are required, other than rework of ductwork to avoid skylights.

In the Cafeteria, unit ventilators located along the exposed side of the building provide ventilation air to the dining room. These units are twenty years old, and it is recommended that they be replaced with new units, located at the new wall. The minimal increase of heating hot water required will not adversely affect the sizing of the piping mains in this area.

The new kitchen will require new exhaust fans for the pizza oven hood, the main cooking line (two fans required), and the dishwasher. It is recommended that all

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connecting ductwork be replaced, and rerouted in the existing shafts. A new make-up air unit shall be provided. Existing ductwork will need to be modified or replaced.

A typical existing classroom in the school is provided with a single unit ventilator, and baseboard radiation. The combination of radiation and unit ventilator extends along the full length of the exterior wall. All interior spaces are conditioned with air ducted from heating and ventilation units. The vast majority of the classrooms are not provided with air conditioning.

Electrical Systems

The building is served by a 3,000 ampere electrical service. The service equipment is approximately 18 years old and is in good condition and shall be reused.

Emergency power is supplied by a diesel fired standby/emergency generator located within the building. The system serves life safety systems (emergency lighting), mechanical equipment, kitchen equipment, and two existing elevators.

Currently two addressable fire alarm systems serve the facility, one in the main school, and one in the Collins Center (auditorium). The main school system will be used for this expansion.

The telecommunications infrastructure for the facility consists of voice and data services from the utilities on the street to the main distribution frame (MDF). Telecommunications throughout the facility is distributed from the MDF to intermediate distribution frames (IDF). Horizontal backbone fiber optic and voice cables extend from the MDF to each IDF. The IDF's serve the station drops at voice and data outlets throughout the facility via copper station cables. The existing telecommunications infrastructure will be used to support new telecommunications requirements in the new addition and renovated spaces.

The existing paging and master clock system is used for general paging, intercom functions, and master clock functions. Combination speaker/clock assemblies are distributed throughout the classrooms.

The existing security system includes motion detection and door alarms on perimeter and select interior doors, connected back to head end control panels.

2.5 Existing Kitchen, Tavares Design Associates, Inc.

Description/Assessment:

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- The kitchen space is large but wasted space because of the shape. The serving line is in a good position in relationship to the main cooking battery.
- The Serving line is a straight line configuration with a deli area, a grab and go space, flat top counter space and two hot well areas. The Hot well areas each have 8 hot wells. There are three cashier locations in the existing layout which are built into the serving line.
- The main cooking battery under the main exhaust hood includes, one Doyon Oven, two double convection ovens, griddle w/six burner range, one warming cabinet and a tilting skillet. The age of the equipment is old with different voltages.
- There are several prep spaces in the kitchen adjacent to the cooking area. These include an ice machine, two compartment refrigerator, worktables, worktable with rack and a microwave oven. The stainless steel tables are scratched, old but in generally okay shape.
- A second prep space is located near the Deli serving line. This area includes two worktables, one worktable with sink, a two compartment reach-in refrigerator and one two compartment reach-in freezer. Adjacent to the Freezer is a single oven. There is no hood above this oven.
- There is very little lighting above the servery.

A concept plan of the new Kitchen/Serving area is included in the Appendix, Section 5.4, with the kitchen report.

2.6 Preliminary Estimate of Asbestos Materials, CDW Consultants, Inc.

The intent of this report was to identify and approximately quantify suspect asbestos-containing building materials (ACM) within the Cafeteria/Kitchen, Library, and potential additions/renovation of the Band and Music Room areas that will be the subject of future renovations. No testing was conducted. The work consisted of a partial document review and a visual assessment and approximation of suspect ACM that could affect renovation costs in the designated areas described above. The findings are primarily based on the observations of a visual site inspection by personnel experienced in assessing asbestos-containing building materials.

Although several different types of suspect asbestos-containing building materials were observed, most of these materials appeared to be in good condition and of recent installation (i.e. installed within the last 15 years). Generally products installed in schools after 1990 do not contain asbestos; however, bulk testing is required in order to confirm this unless the building materials have been installed under the direction of an Architect that has certified them as non-asbestos-containing materials. Since this

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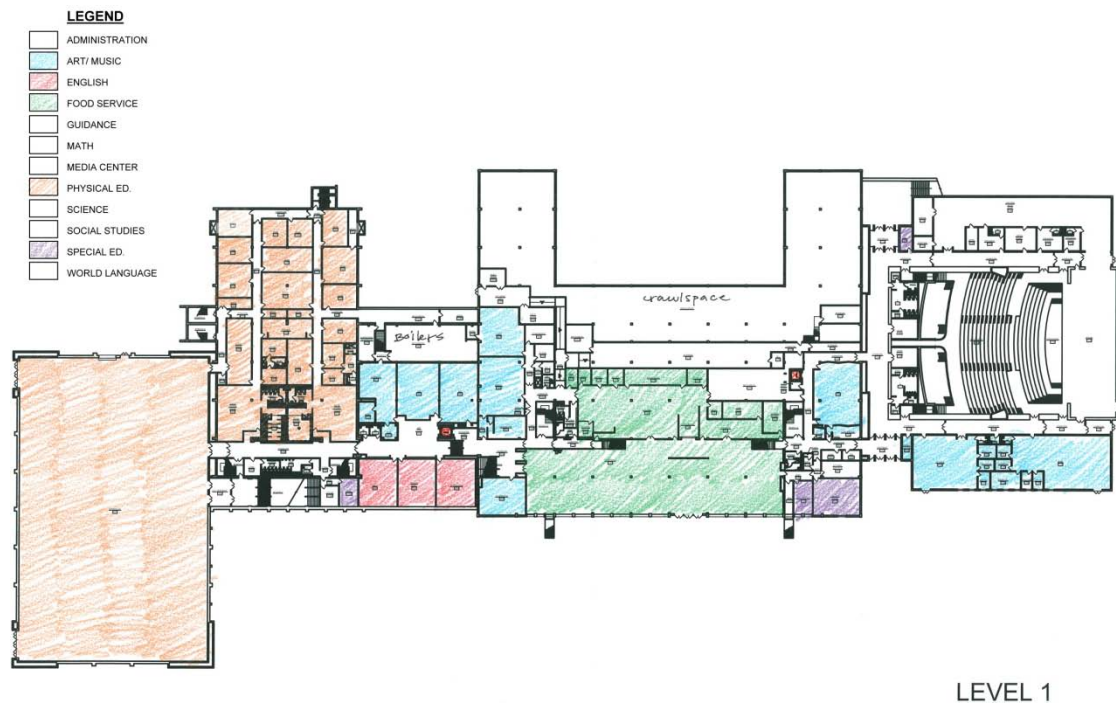
documentation has not been provided to us, the presumption must be that the materials are suspect ACM. These materials will need to be sampled and analyzed for asbestos in accordance with federal regulations prior to any renovations that may disturb this material.

In the Appendix to this report, Section 5.5, there is a list of suspect asbestos-containing building materials and approximated quantities. We do not anticipate that all of the suspect asbestos building materials identified during the visual inspection will test positive or be subject to renovation. As such, and for feasibility evaluations purposes, we feel that assuming as much as 25% of the materials may require abatement is a reasonable estimate at this time.

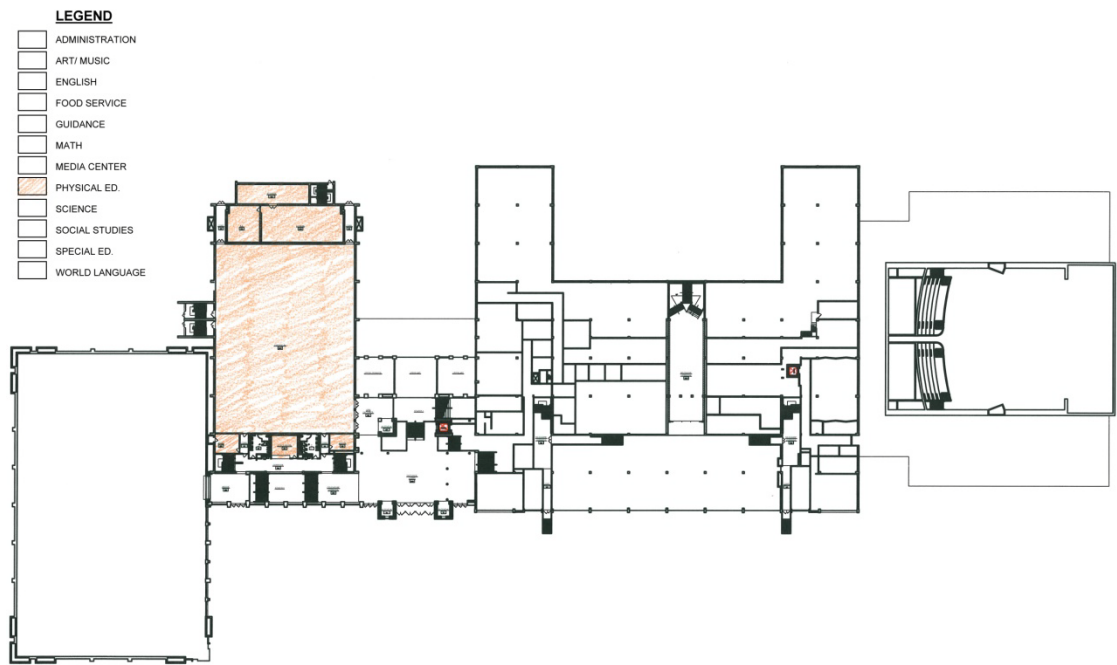
It is important to note that window caulking in the areas described as being potentially part of the scope of planned renovations may contain PCB's. We recommend including PCB analysis into the scope of any bulk sampling program to be conducted associated with continued feasibility analyses, as well as a hazardous building materials survey that would be inclusive of fluorescent lighting, ballasts, emergency lighting, etc.

2.7 Existing Space Use, DRA, Inc.

The school is organized by departments, with the majority of departmental spaces in close proximity to each other, as illustrated in the following floor plan diagrams.

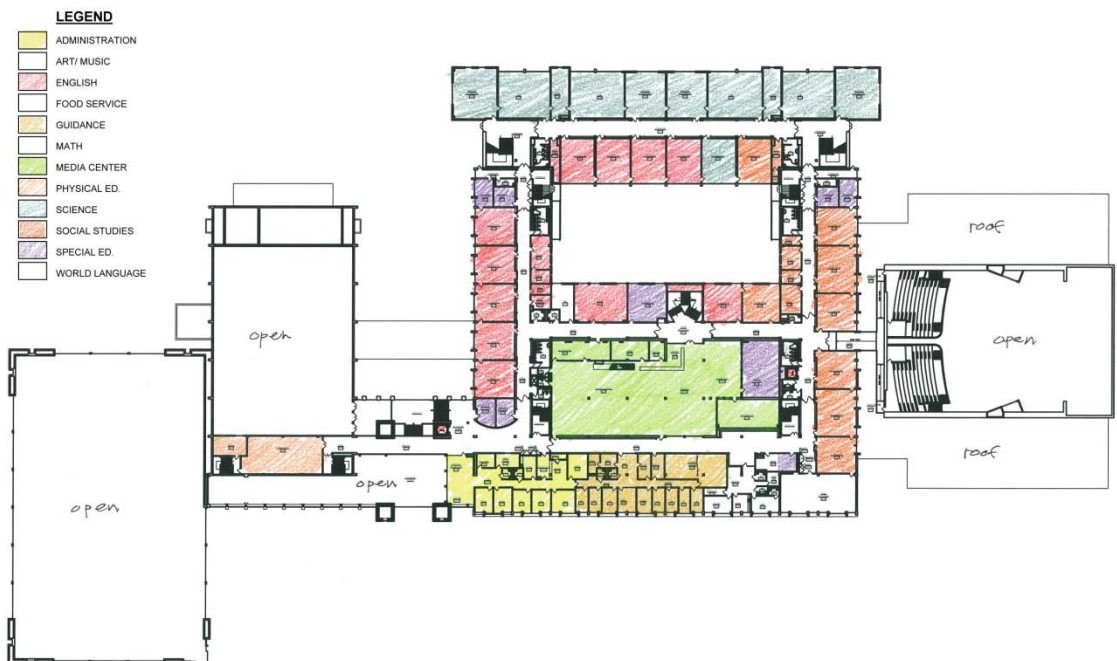


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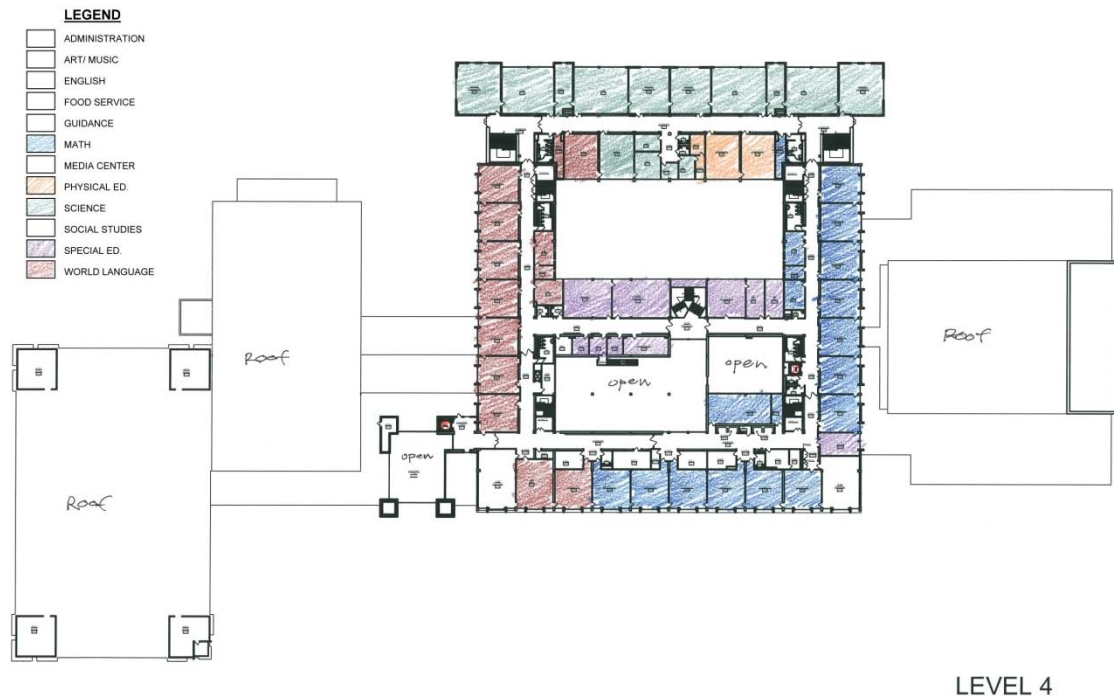
LEVEL 2

Note: On the right half of the plan of Level 2, the majority of areas are looking down into rooms below and do not represent usable floor space at this level.



LEVEL 3

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The existing high school contains 75 academic classrooms on three floors. These classrooms serve the following departments:

Existing CR count

<u>Department</u>	<u>Level 1</u>	<u>Level 3</u>	<u>Level 4</u>	<u>Total</u>
English	3	11		14
Soc Studies		8		8
Interdiscip.*		1	2	3
Math			14	14
Science		9	9	18
World Lang			10	10
Health			2	2
Art	6			6
	9	29	37	75

*Interdisciplinary classroom is used by more than one department at a time, a larger space for a larger group of students.

Not counted: SPED, Media Center comp labs, Music, Phys Ed., TV Studio

According to the high school administration, the school was designed for a capacity of 1600 students, and currently they have 1800 students. The goal for this study is to test the feasibility of increasing the capacity to 1900 students. See Chapter 3-- Proposed Solutions for the proposed renovations and additions to accommodate 1900 students.

3

Proposed Solutions

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Proposed Solutions

3.1 Needs identified

In the Request for Qualifications (RFQ) issued by Andover, the following needs were identified:

- a. Additional classroom space for a projected total enrollment of 1900 students.
- b. Redesign of the current Library/Media Center into a more flexible space to support current and future learning approaches.
- c. Additional seating capacity in the cafeteria and a third meal line to serve the projected enrollment.
- d. Additional SPED classrooms and office/meeting space.

The study team met with members of the high school administration, staff, and faculty to conduct a series of architectural programming interviews, in order to gain insight into the operations of the school, and relate the educational program needs to square footage and adjacency needs. Plans of the existing building were reviewed and electronic versions were created, and areas of existing spaces were determined. An architectural program was generated and reviewed with the school, which is summarized here.

3.2 Proposed Square Footage Program

The existing high school contains 75 academic classrooms on three floors (see Existing Floor Plans in the Appendix, Sec. 5.6). These classrooms serve the following departments:

Existing CR count

<u>Department</u>	<u>Level 1</u>	<u>Level 3</u>	<u>Level 4</u>	<u>Total</u>
English	3	11		14
Soc Studies		8		8
Interdiscip.		1	2	3
Math			14	14
Science		9	9	18
World Lang			10	10
Health			2	2
Art	6			6
	9	29	37	75

*Interdisciplinary classroom is used by more than one department at a time, a larger space for a larger group of students.

Not counted: SPED, Media Center comp labs, Music, Phys Ed., TV Studio

In a high school, a good rule of thumb for planning is to count 85% of the seats in academic classrooms to determine the school capacity. Some classes are essential for

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a well-rounded education but are not fully occupied, such as Advance Placement (AP) courses, and elective courses. To allow the flexibility to schedule such classes, the 85% rule is used to determine the number of classrooms required. The following calculation starts with the target enrollment of 1900 students and calculates the number of academic classrooms that are needed, which is 90:

Proposed CR count		Revised 1/31
Enrollment Target:	1900	students
Classroom Loading:	25	students per classroom
Utilization Factor:	85%	percentage of seats full
Classrooms Needed:	90	classrooms needed
Classrooms Existing:	75	classrooms existing
Proposed CR Added:	15	classrooms to be added

Classroom additional allocations:		Total after addition:
English	2	16
Soc Studies	3	Odyssey 11
Interdiscip.	2	Smart classroom 5
Math	2	16
Science	3	Engineering; comp lab 21
World Lang	2	12
Health	0	2
Art	0	6
Drama	1	1
Total:	15	90 classrooms

The proposed classroom assignments are based on both the programming interviews and the existing classroom count. (Interdisciplinary classrooms are jointly used by more than one department for special projects and activities.) On the next page, the classrooms areas are listed and totaled in the Program of Additional Spaces. At the bottom of the spreadsheet, a factor is used to estimate the gross area of addition to support the listed program spaces, which are net areas. The actual size of the proposed addition will be verified by creating test fit plans over the existing drawings.

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DRAFT Program of Additional Spaces

Classrooms:	Number	Size Each	Total Area	Capacity (Students)	Comment
Interchangeable classrooms	8	800	6,400	200	English, Soc Stu, Math, Lang
Large classrooms	2	1100	2,200	90	Interdisciplinary
Engineering	1	1100	1,100	25	Science department
Science computer lab	1	1100	1,100	26	
Science classroom/lab	1	1200	1,200	26	
Odyssey classroom	1	1100	1,100	25	World culture
World language active classroom	1	1100	1,100	25	
Drama classroom	1	1000	1,000	25	
TOTALS:	16		15,200		Net areas
Specialized Spaces:	Number	Size Each	Total Area	Capacity (Students)	Comment
SPED Learning center	2	800	1,600		Move out of Media Center
Computer lab	1	1100	1,100	25	Move out of Media Center
Dance studio	1	1600	1,600	16	Adjacent to Collins Center
Copy room	2	100	200		
Conference room	4	250	1,000		
Subtotal of net spaces:	10		20,700	70%	
Mech., toil., circul., structure			8,900	30%	Rule of thumb estimate
TOTAL Gross Square Feet:			29,600	100%	Total space to be added

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3.3 Cafeteria Concept

The Andover High School cafeteria is large, but not large enough. The existing dining room contains 9100 square feet (s.f.), but some of that space is used by stairs and circulation space which cannot contain seating and tables. Approximately 7300 s.f. are available for dining, which should be able to hold 480 students (at 15 s.f. per seat). The fire limit for the cafeteria is 450 persons, according to information gathered



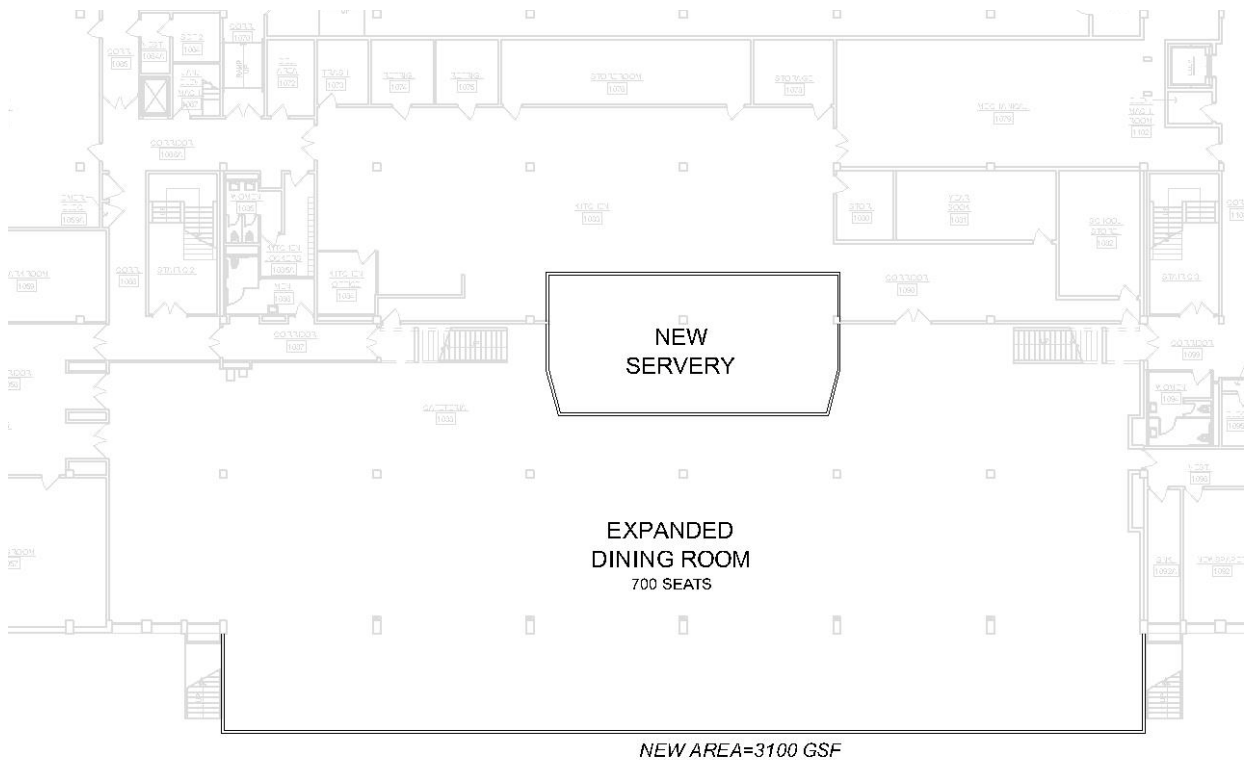
during the programming interviews. Currently, they serve 4 lunches per day, so the cafeteria capacity is $4 \times 450 = 1800$. However, Andover would like to return to 3 lunchtime seatings rather than 4 they currently have, so they need at least 640 seats ($3 \times 640 = 1920$).

The reason three lunches are being requested has to do with the schedule. Time for lunch is added to one block in the day. During that block, the students in each classroom are scheduled to go down to lunch at the same time. Those who have either first or last lunch have uninterrupted class time, but those in the middle two lunches (approximately half the students) take time out of the middle of their block for lunch. For this reason, science labs and physical education classes are given preference for the uninterrupted first and last lunch times. By offering three lunches, the schedule would gain flexibility and provide more uninterrupted learning time. To improve this situation, the architect is programming the cafeteria for a capacity of 700 seats, allowing the middle lunch to be as low as 500 seats.

In addition, the serving area is insufficient for the number of meals they are trying to serve in the limited lunch time, and food choices are limited. A "food court" type serving area would be a great improvement, allowing both faster service and greater number of choices. Floor space to accommodate the food court will occupy part of the dining room between the two staircases.

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The additional seating space and the additional food court space necessitate an addition to the cafeteria of 3100 s.f., as shown on the partial plan below.



Construction Cost Estimate for Kitchen and Cafeteria

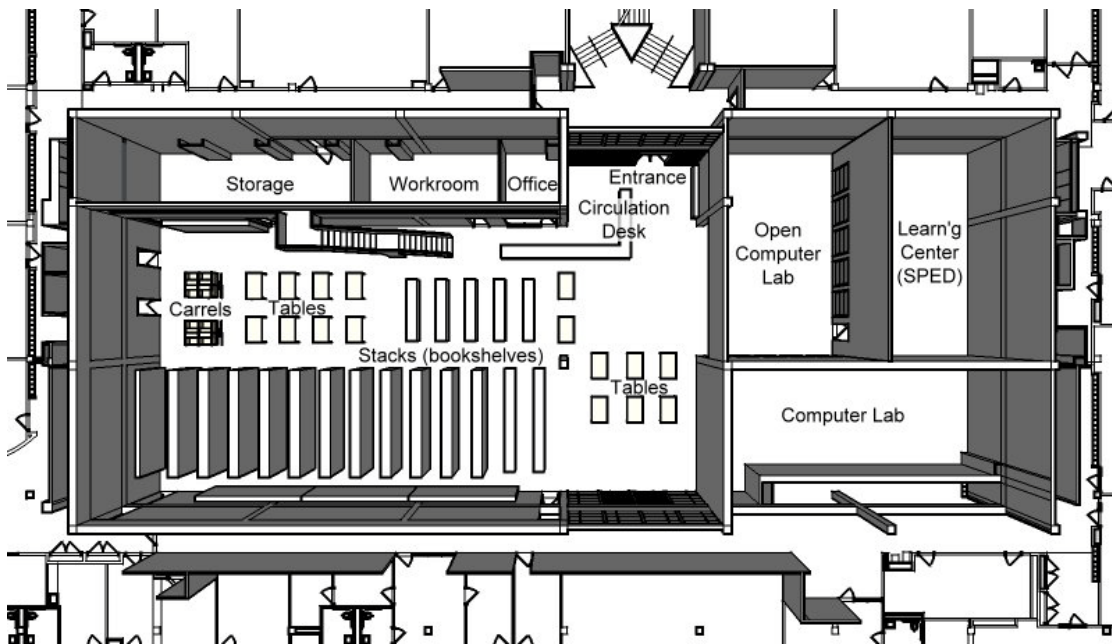
These items apply to the Base Option, Alternative 1, and Alternative 2.

Cafeteria Addition	\$1,325,000
Kitchen Renovation	\$1,885,000
Cafeteria Renovation	\$1,730,000
Cafeteria Sitework	\$552,000
Total	\$5,492,000

For detailed cost estimate, see the A.M. Fogarty report in the Appendix, Sec. 5.8.

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3.4 Media Center Concept



The existing high school Library or Media Center, containing 10,400 square feet, is located on the top two floors of the building. It has no external windows. The main reading room is two stories high. The single-story office and storage areas are located along one side of the main room, with an overlooking mezzanine above containing spaces that are no longer associated with the library. A concrete stair runs from the floor of the main room up to the mezzanine.



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An existing pair of small toilet rooms are located at the end of the main room, directly accessible from the library.

An enclosed computer lab and an open computer lab are located across from the circulation desk. An enclosed classroom is being used as a Learning Center, a special education space not necessarily associated with the library. It has no opening to the corridor, and it is accessed through the library itself.



Media Center as a Digital Commons

The role of the media center has changed from what it once was. It is being transformed from a repository of printed materials into a "digital commons." More space is needed for collaborative work in groups of different sizes, from small groups to whole classes, often with access to technology to capture and manipulate material from multiple sources, such as books, newspapers, videos, and web sites. The media center has become a place to foster critical thinking, collaboration, and creativity.

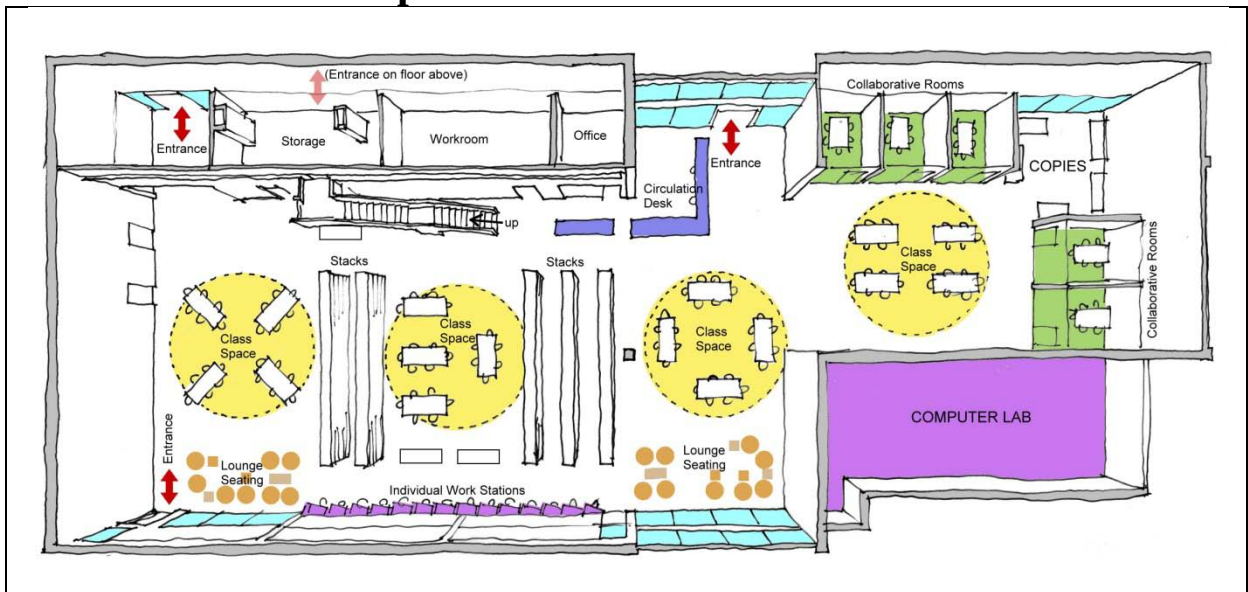
To help promote this transformation, the proposed media center concept includes the following specific features:

- Increase visibility into the Media Center (MC).
- Increase access to the MC (include more entrances).
- Increase area available to the MC (relocate the Learning Center, and the open computer lab).
- Repurpose the mezzanine offices for MC use.
- Introduce natural light and more awareness of the outdoors (via skylights or clerestories).
- Create spaces for collaboration and spaces for group presentations (several conference-size to classroom-size zones).
- Reduce space for the book collection (stacks).
- Improve the acoustics (separate group spaces, reduce room reverberation and echoes).
- Provide for greater technology use in the MC (data drops, wifi hot spots, charging stations, shared screens, printers, and secure equipment storage).

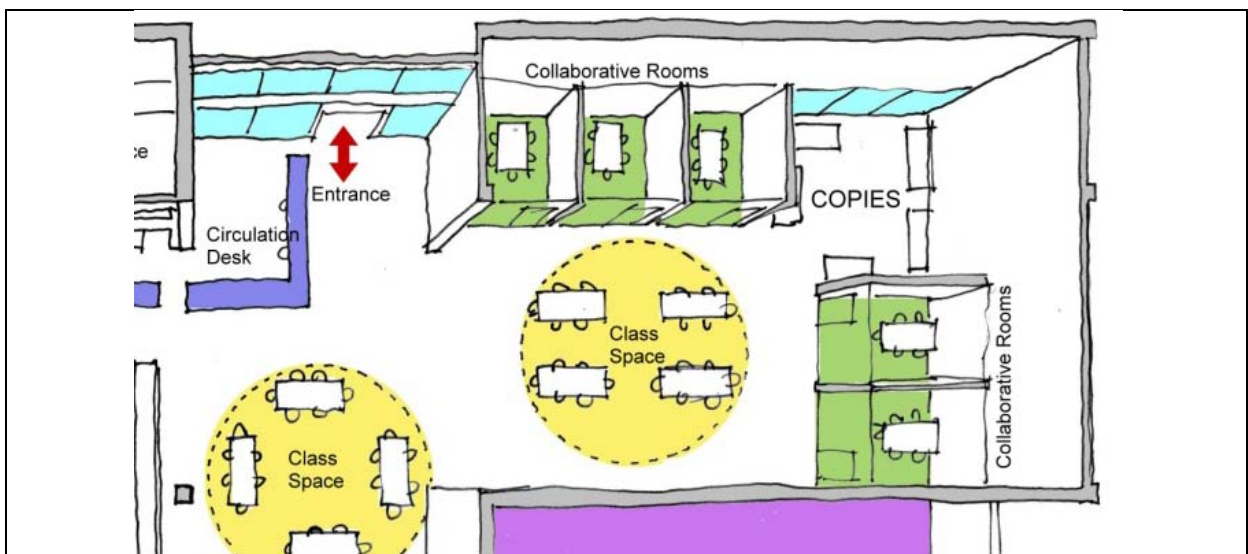
Andover High School - Feasibility Study

Concept sketches for the Media Center are presented not as final designs, but rather as aids to envisioning how these changes might be realized when the renovations go forward. These are "broad brush" images, provided before all the details have been designed. Please note that changes to building systems (lighting, power, data, HVAC, and acoustics) will also be necessary to complete the project successfully. Surfaces will be updated, some with new materials, textures, and colors. Where necessary, furniture and equipment will be replaced with new items offering durability and flexibility.

Media Center Conceptual Sketches

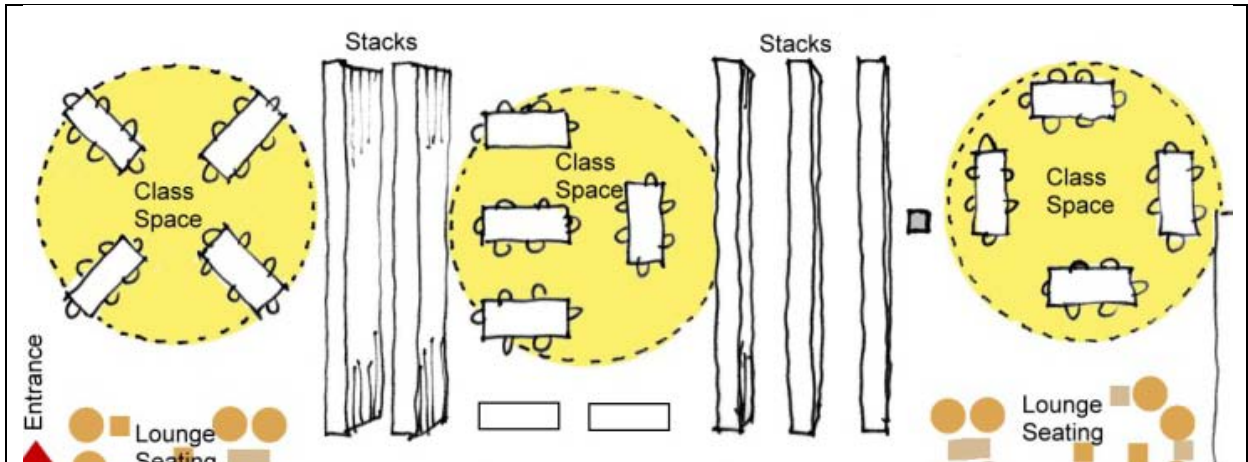


Overall MC Concept Floor Plan -- showing four class-size collaborative spaces (yellow).

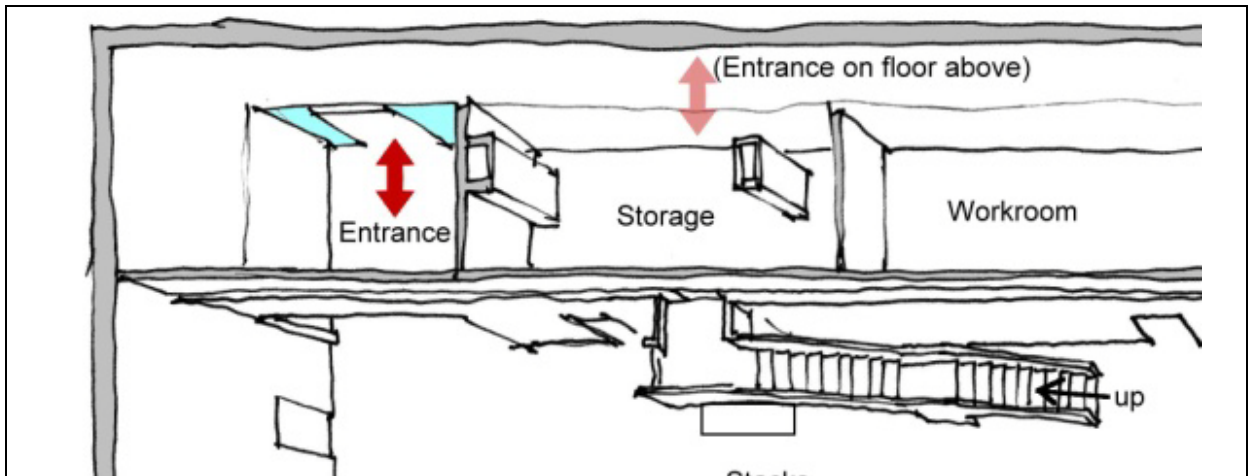
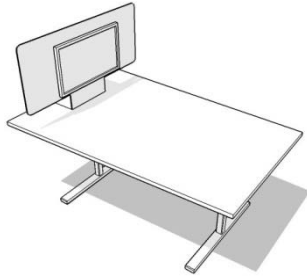


Collaborative conference rooms (green) -- each has a glass front wall allowing supervision. Copiers and printers are located in the corner, with new windows allowing views of the MC.

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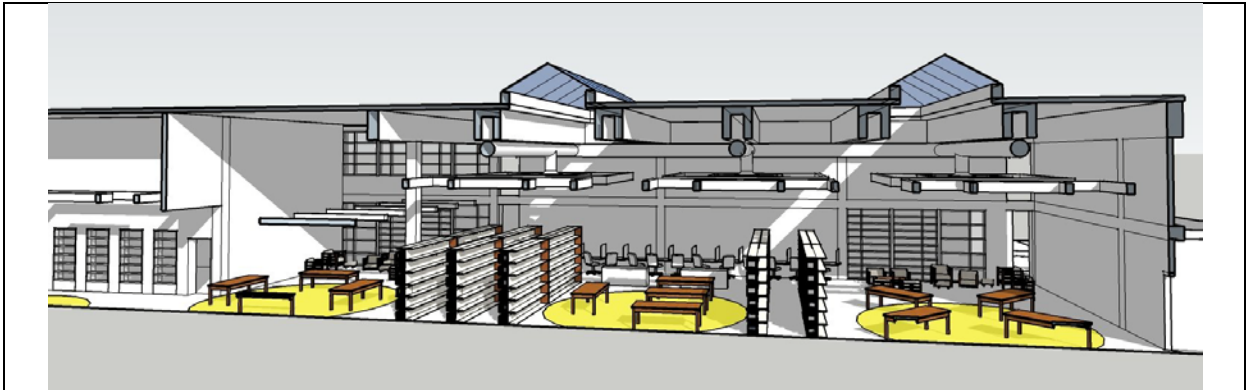


Bookshelves give separation between class spaces. Tables support small group collaboration with attached flat screen displays, and integrated outlets for data and power.

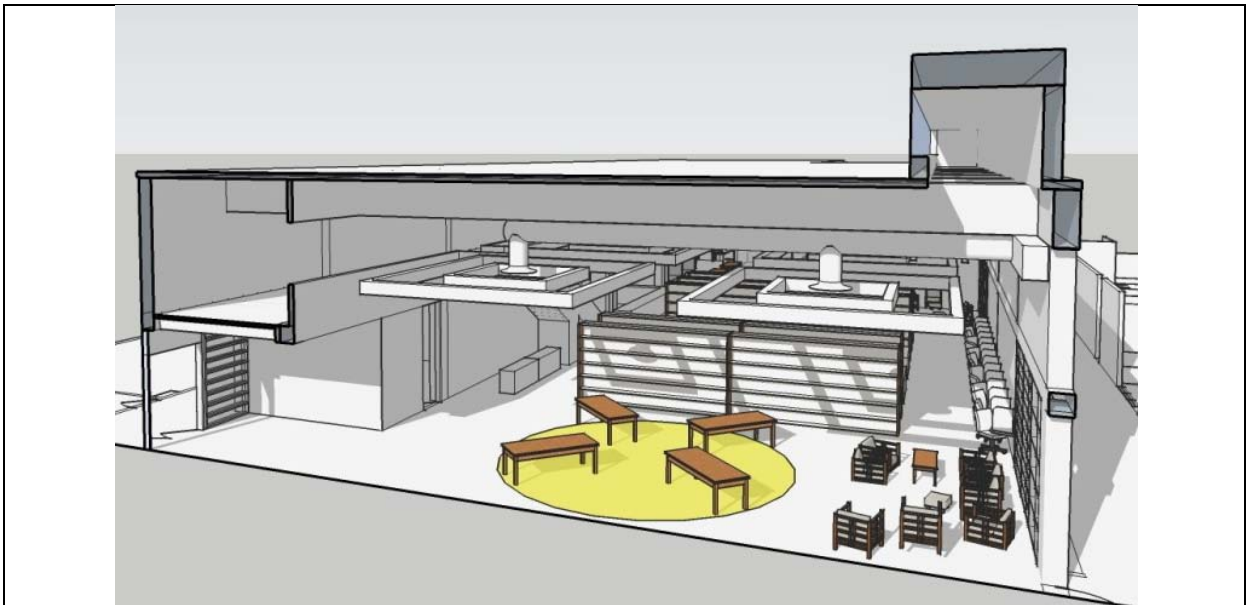


New entrances to the MC improve access to the Digital Commons. More windows from the adjacent corridors improve visibility of the space and its activities.

Andover High School - Feasibility Study



Cross Section -- showing skylights bringing natural light into the Media Center.



Alternative Cross Section -- showing a rooftop monitor with clerestory windows

Construction Cost Estimate for Media Center

These items apply to the Base Option, Alternative 1, and Alternative 2.

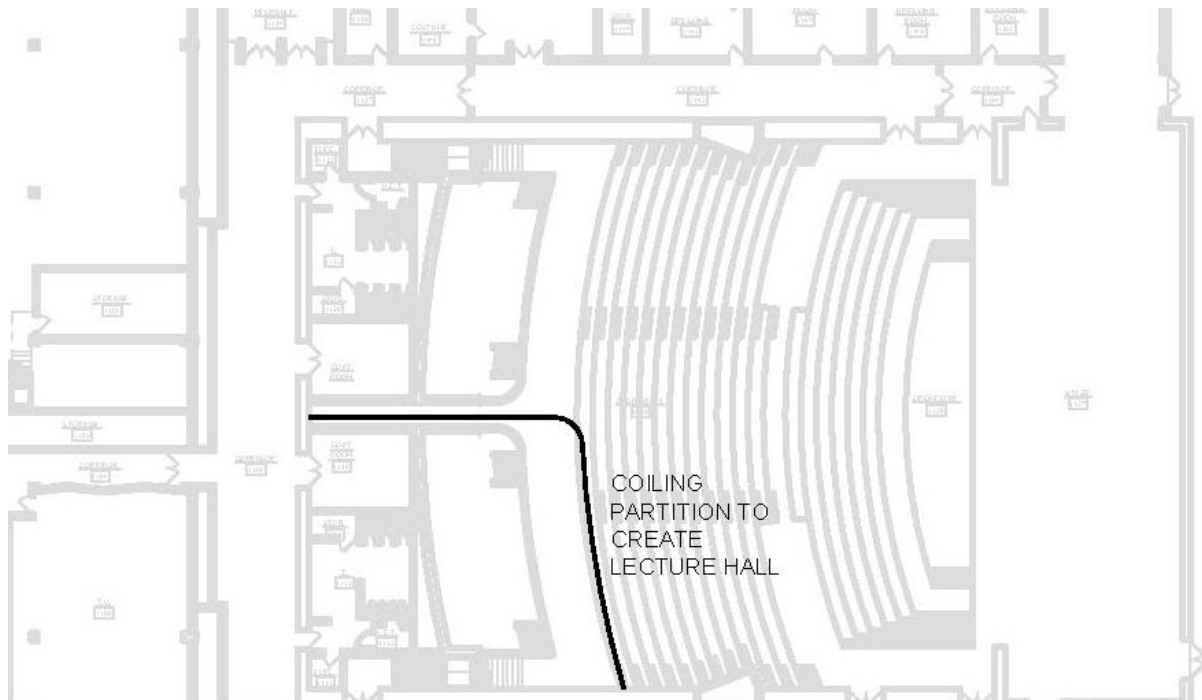
Media Center Renovation	\$1,741,000
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For detailed cost estimate, see the A.M. Fogarty report in the Appendix, Sec. 5.8.

Andover High School - Feasibility Study

3.5 Lecture Hall Concept

Several departments spoke to the need for a meeting space large enough for 100-150 students. Such a function could be satisfied by the Auditorium, if part of the seats could be enclosed, forming a lecture hall, similar to the following photo:



The Auditorium plan shows a location for the proposed coiling partition to create the Lecture Hall. This part of the seating contains more than 150 seats.

Construction Cost Estimate for the Auditorium Operable Partition

This item applies to the Base Option, Alternative 1, and Alternative 2.

Operable Partition \$269,000

For detailed cost estimate, see the A.M. Fogarty report in the Appendix, Sec. 5.8.

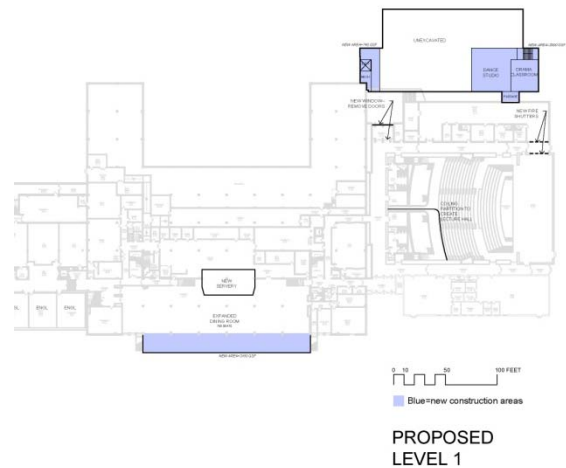
Andover High School - Feasibility Study

3.6 Classrooms Concept, Base Option

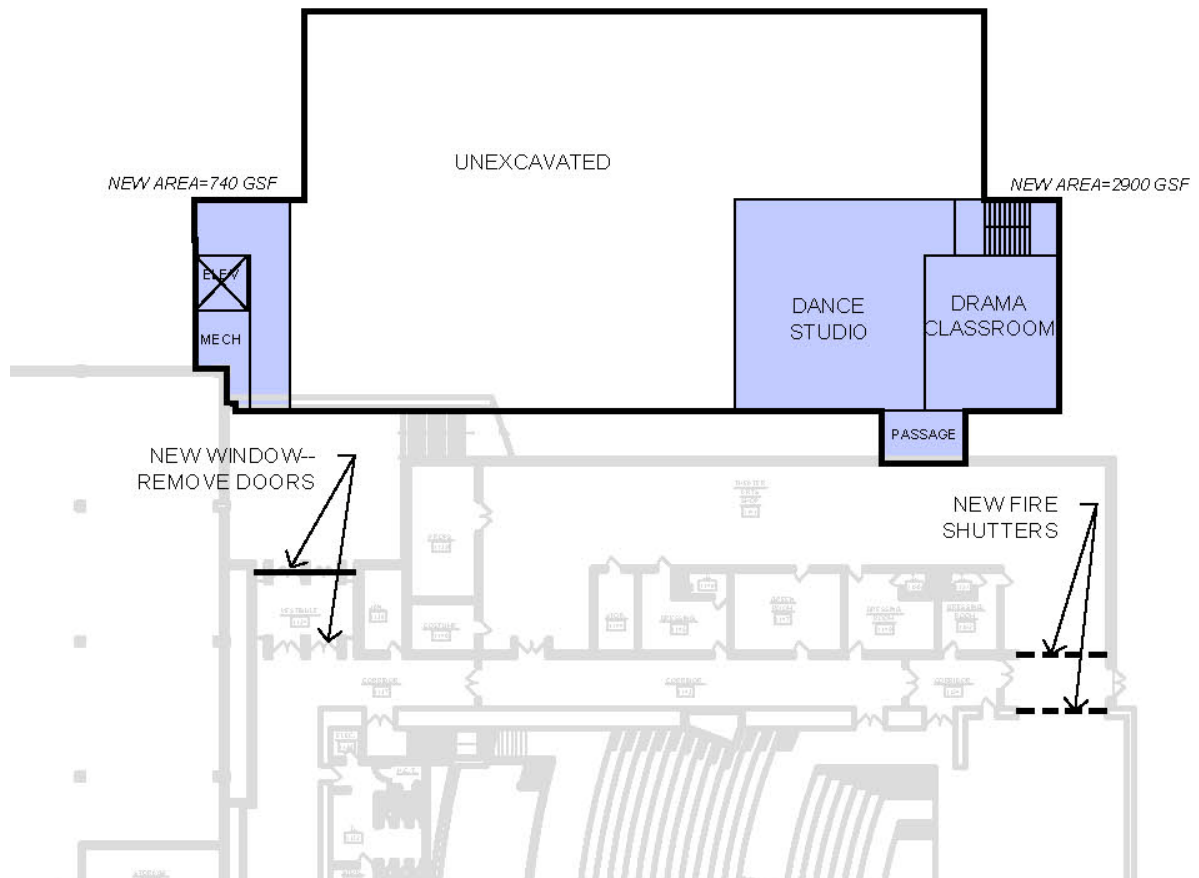
The Base Option for classrooms proposes the construction of a 3-story addition at the back corner of the existing school. The floors of this addition align with the adjacent floors of the existing classroom wing.

The total size of the additions (including cafeteria extension) are approximately 32,000 square feet (s.f.) based on the test fit conceptual plans shown here. (For full page plans, see the Appendix, Sec. 5.7.)

Individual floors of the addition will be detailed on following pages.



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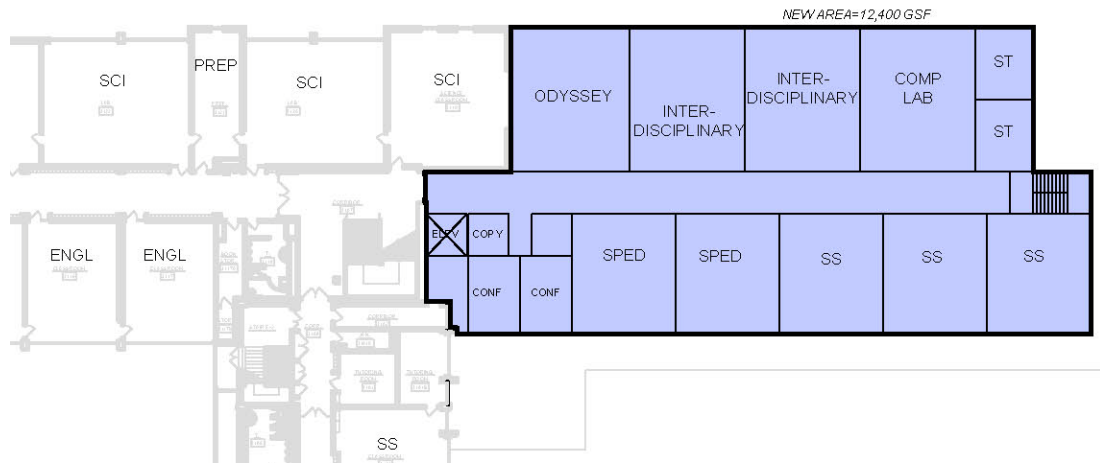


Level 1 of the proposed addition contains the lowest level of the elevator, with its mechanical room, the Dance Studio, and the Drama Classroom. These spaces are at the same elevation as the adjacent auditorium wing, and a small passage from the backstage area connects to the Dance Studio and the Drama Classroom. The stair from the upper levels also connects to these two rooms.

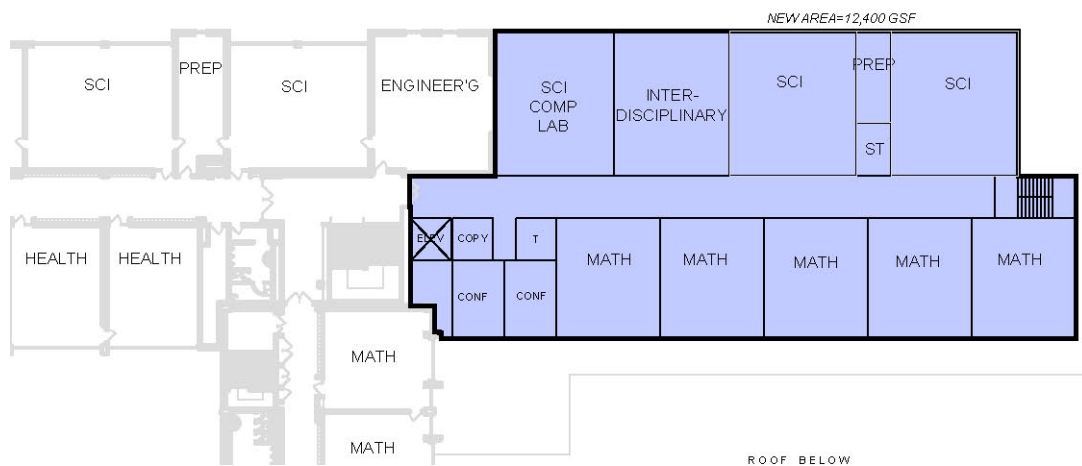
The Auditorium corridor will end with new windows facing the new addition, and fire shutters will be added at the end of the side corridor, allowing people to exit to the perimeter driveway.

(Note: Level 2 is an interstitial space containing no classroom spaces, so it is not included here.)

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Level 3 of the proposed addition contains a mixture of Social Studies, Science, and Special Education classrooms, with a pair of small group/conference rooms near the elevator. It also contains two Interdisciplinary classrooms, which can be used jointly by more than one department for special projects and activities. The Odyssey Room houses a world culture program, part of the Social Studies department.



Level 4 of the proposed addition contains two Science Labs, a Science Computer Lab, an Interdisciplinary Classroom, and five Math Classrooms. It also has two small group/conference rooms and a copy room near the elevator. An elevator in this location serves not only handicapped access needs, but also helps the Science department to move equipment and supplies between the two floors of their department. The Science Classroom adjacent to the addition is renovated to serve as an Engineering Classroom.

Andover High School - Feasibility Study

Construction Cost Estimate of Base Option for Classroom Addition

Classroom Sitework	\$725,000
Classroom Addition	\$9,614,000
Renovation for new means of egress	\$100,000
Sprinkler at Existing School	\$2,419,000
Asbestos Abatement Allowance	\$100,000
Total for Base Option	\$12,958,000
Kitchen & Cafeteria Total	\$5,492,000
Media Center Total	\$1,741,000
Auditorium Operable Partition Total	\$269,000
Total of All Work	\$20,460,000

For detailed cost estimate, see the A.M. Fogarty report in the Appendix, Sec. 5.8.

Andover High School - Feasibility Study

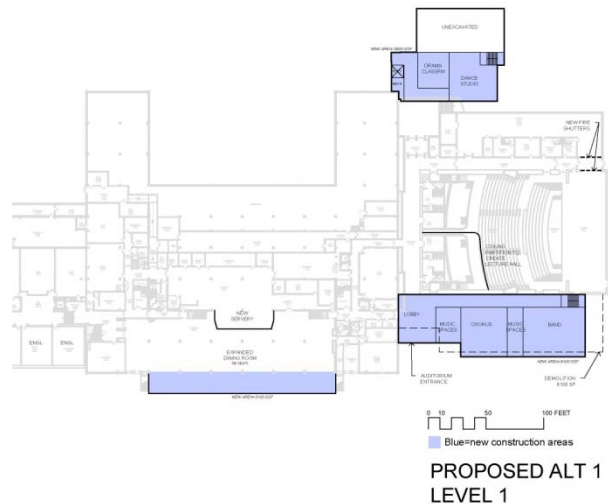
3.7 Classrooms Concept, Alternative 1

The Alternative 1 for classrooms proposes the construction of two 3-story additions on either side of the Auditorium. The floors of these additions align with the adjacent floors of the existing classroom wing.

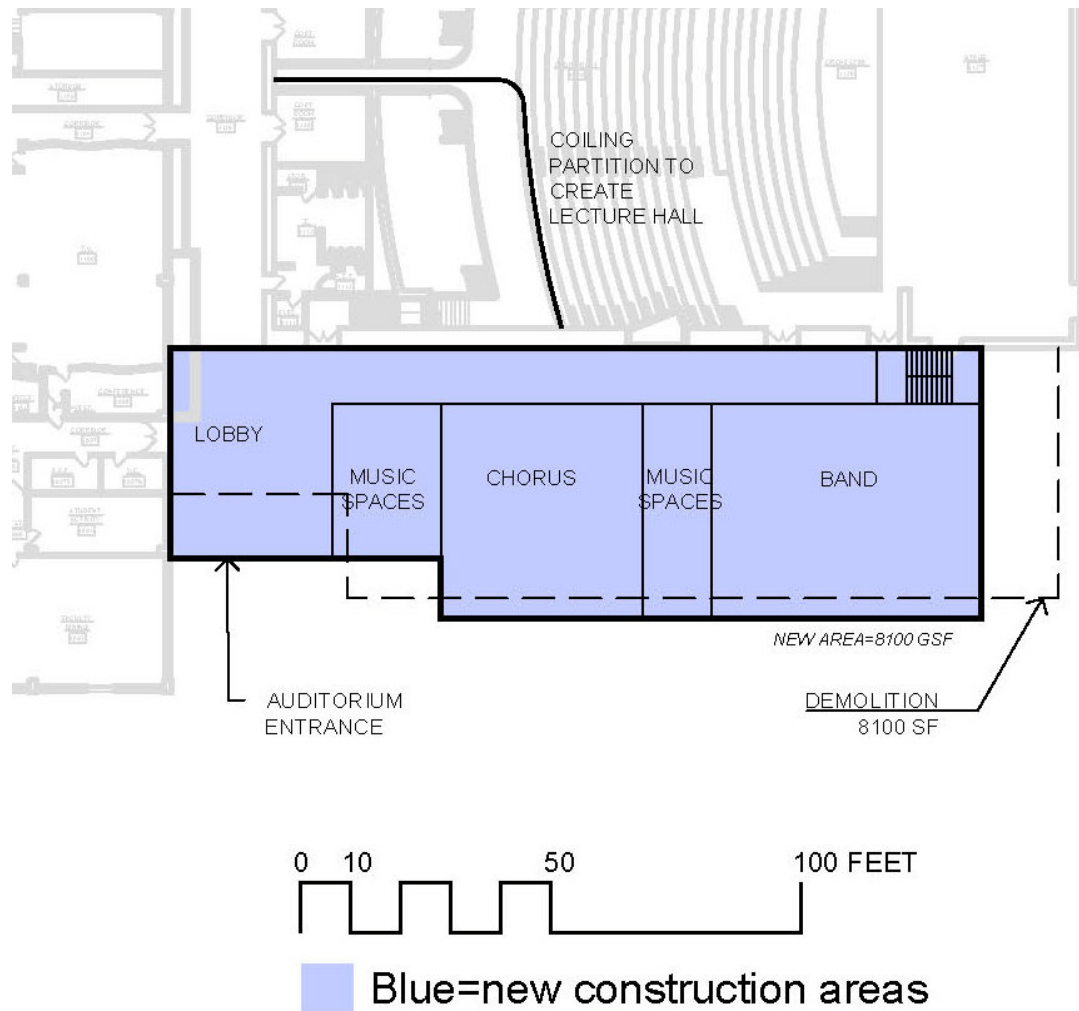
The total size of the additions (including cafeteria extension) are approximately 45,400 square feet (s.f.) based on the test fit conceptual plans shown here. (For full page plans, see the Appendix, Sec. 5.7.)

This alternative concept yields a smaller footprint for the addition at the back of the school, and creates a new front elevation, covering the blank Auditorium wall on the upper levels.

Individual floors of the addition will be detailed on following pages.



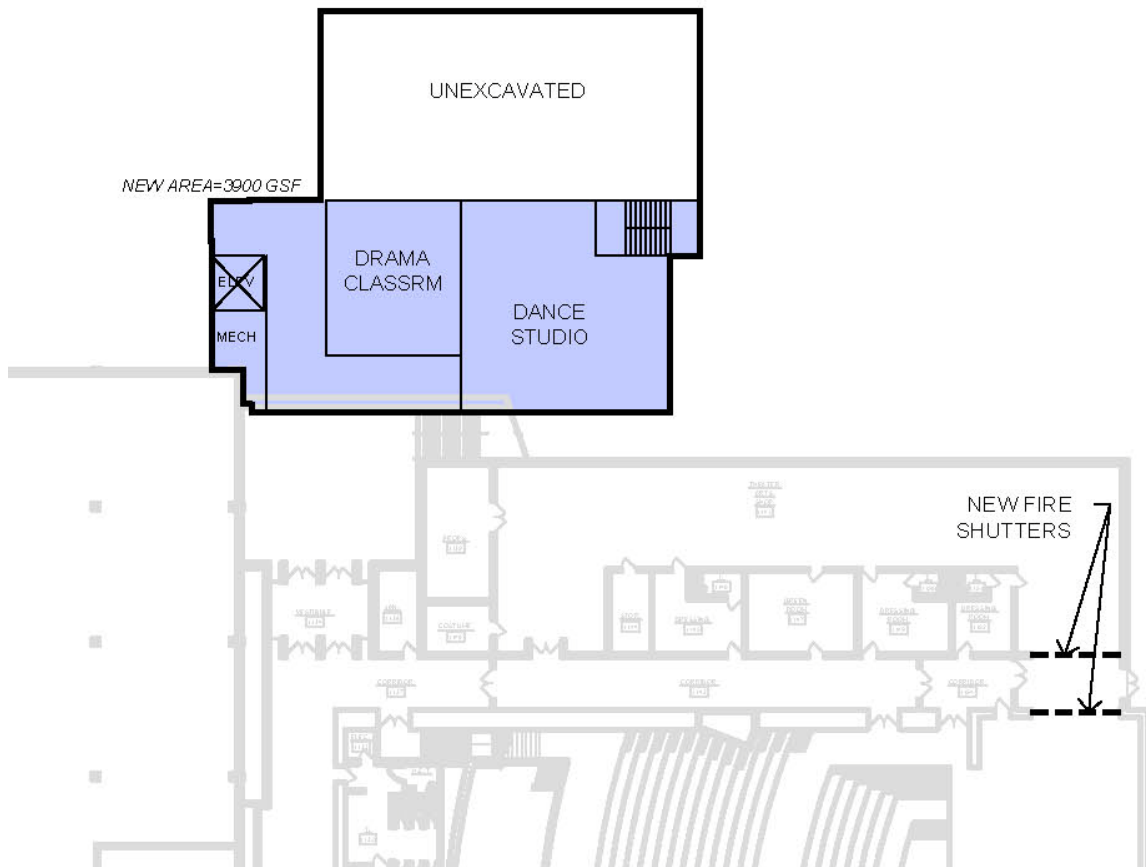
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A new three-story addition would be located against the front wall of the Auditorium, replacing an existing one-story wing containing the Auditorium entrance, the band room and the chorus room, with associated practice spaces, a demolition of approximately 8100 s.f.

Level 1 of the new addition contains the new Chorus and Band rooms, as well as the practice, storage, and office spaces that are part of the Music department.

Andover High School - Feasibility Study

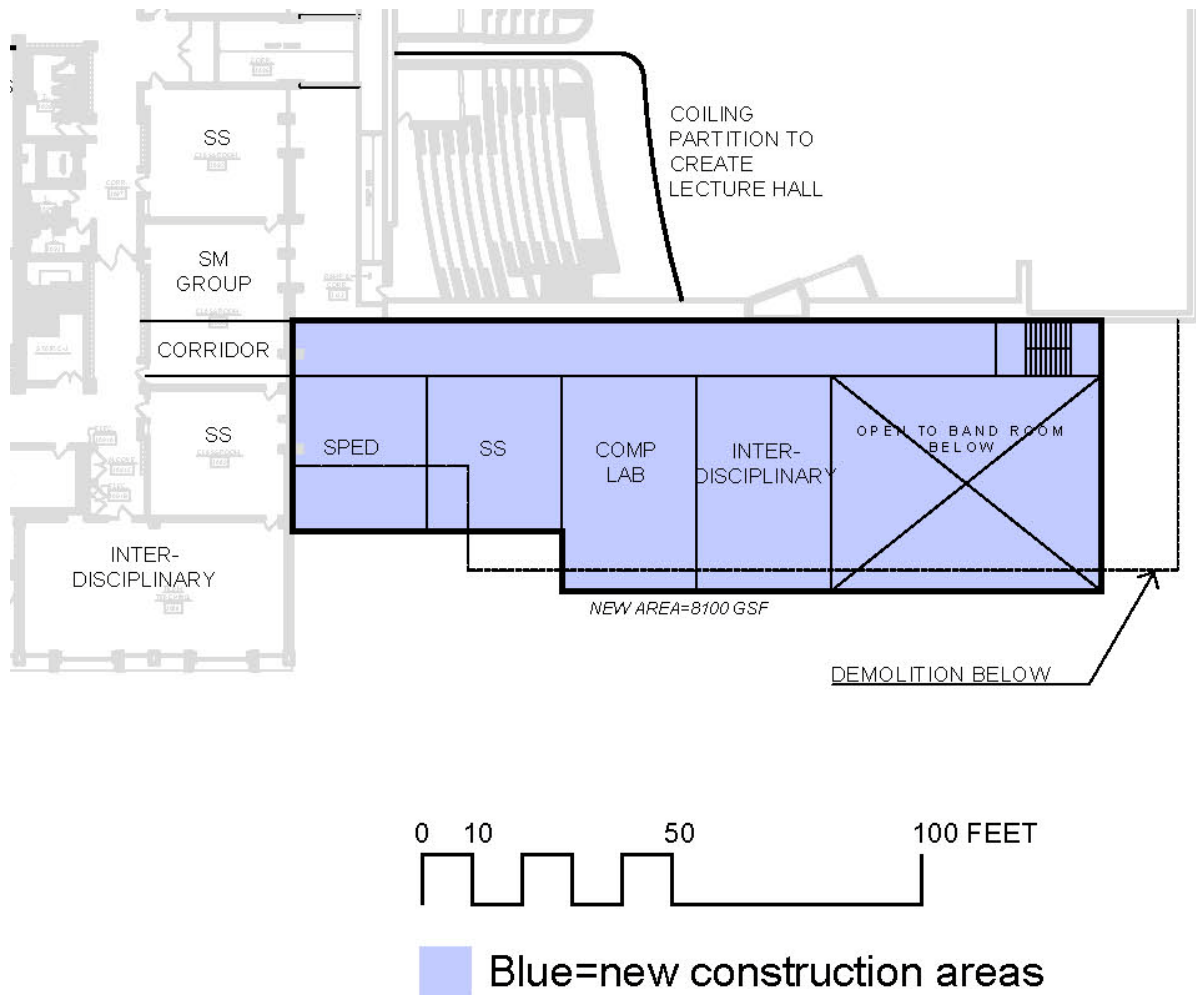


The three-story addition at the back corner of the school, on **Level 1** contains a new Drama Classroom and a new Dance Studio, with the elevator and its mechanical room.

The Auditorium corridor will extend to the new addition, and fire shutters will be added at the end of the side corridor, allowing people to exit to the perimeter driveway.

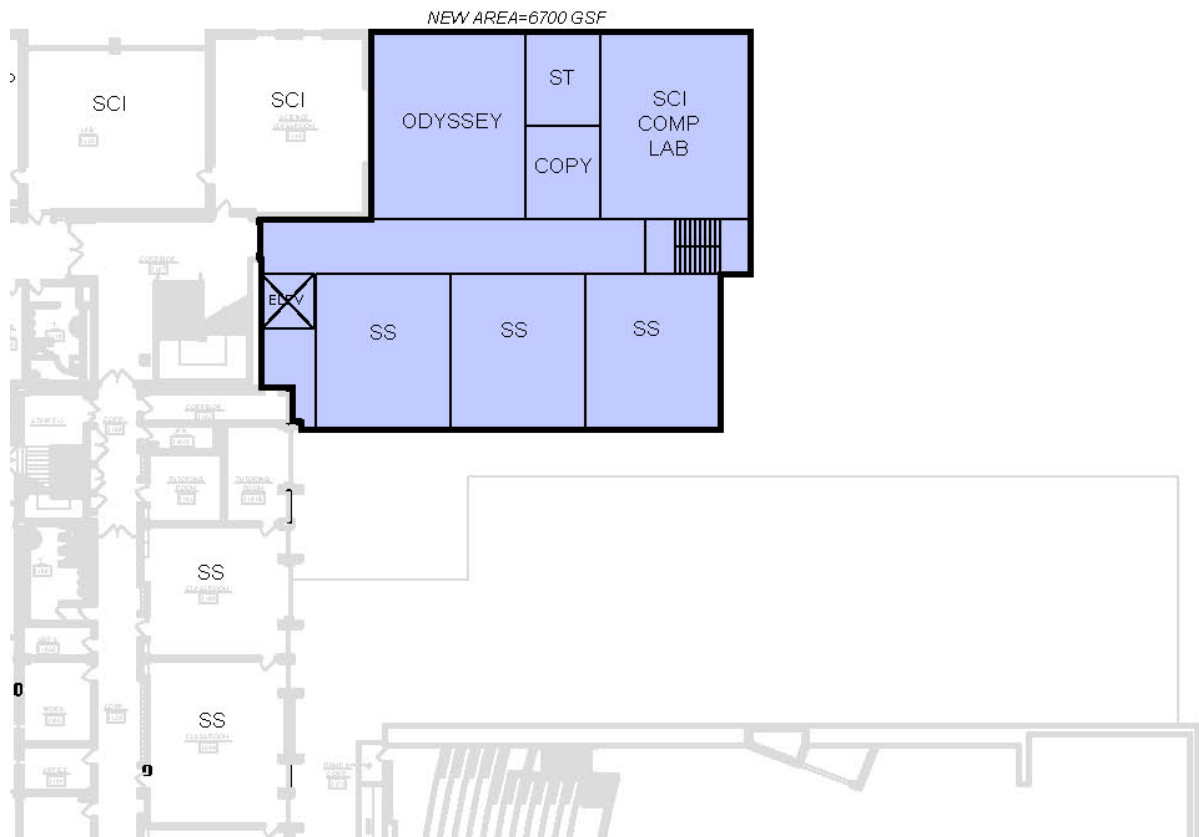
(Note: Level 2 is an interstitial space containing no classroom spaces, so it is not included here.)

Andover High School - Feasibility Study



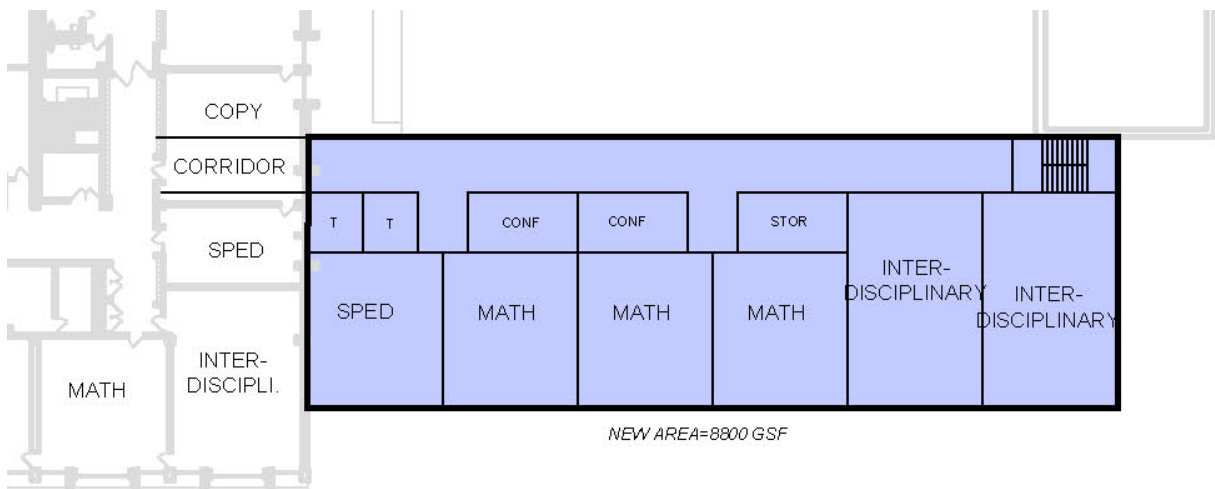
Level 3 of the addition at the front of the school contains a single-loaded corridor and stair, and classrooms for Special Education, Social Studies, a Computer Lab, and an Interdisciplinary Classroom. The new corridor connects to the existing corridor, taking space from a former classroom, which becomes a Small Group room.

Andover High School - Feasibility Study



Level 3 addition at the back corner of the school contains the Odyssey Room which houses a world culture program, part of the Social Studies department. Three Social Studies classrooms are across the corridor. Down at the end of the corridor is the Science Computer Lab.

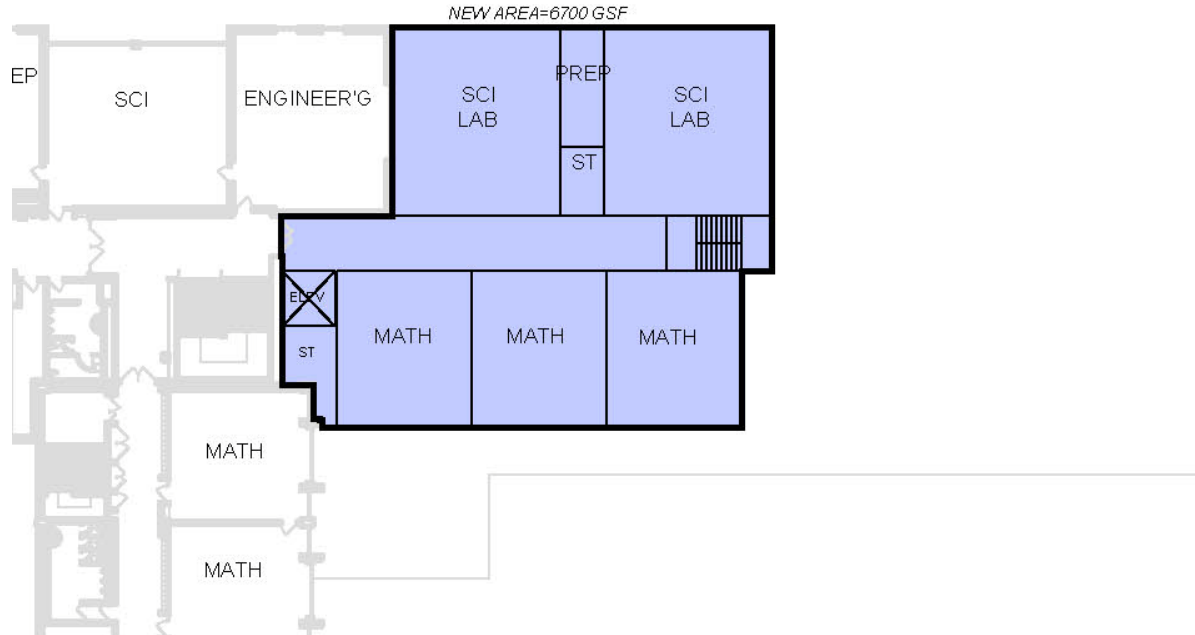
Andover High School - Feasibility Study



 Blue=new construction areas

Level 4 addition at the front of the school contains three Math Classrooms, a classroom for Special Education, two Conference/Small Group rooms, and two Interdisciplinary Classrooms. The new corridor connects to the existing corridor, taking space from a former classroom, which becomes a Copy room.

Andover High School - Feasibility Study



Level 4 addition at the back of the school contains three Math classrooms and a pair of new Science Labs with a shared Prep Room between them. The Science Classroom adjacent to the addition is renovated to serve as an Engineering Classroom.

An elevator in this location serves not only handicapped access needs, but also helps the Science department to move equipment and supplies between the two floors of their department.

Andover High School - Feasibility Study

Construction Cost Estimate of Alternative 1 for Classroom Addition

Classroom Sitework	\$683,000
Classroom Addition	\$14,302,000
Renovation for new means of egress	\$100,000
Sprinkler at Existing School	\$2,419,000
Asbestos Abatement Allowance	\$100,000
Total for Alternative 1	\$17,604,000

Kitchen & Cafeteria Total	\$5,492,000
Media Center Total	\$1,741,000
Auditorium Operable Partition Total	\$269,000
Total for All Work	\$25,106,000

For detailed cost estimate, see the A.M. Fogarty report in the Appendix, Sec. 5.8.

Andover High School - Feasibility Study

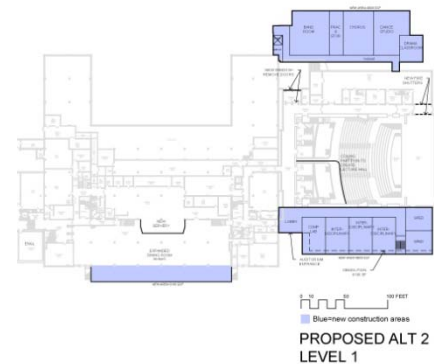
3.8 Classrooms Concept, Alternative 2

The Alternative 2 for classrooms proposes the construction of a 3-story additions at the front of the Auditorium, and a single-story addition at the back of the school. The floors of these additions align with the adjacent floors of the existing classroom wing.

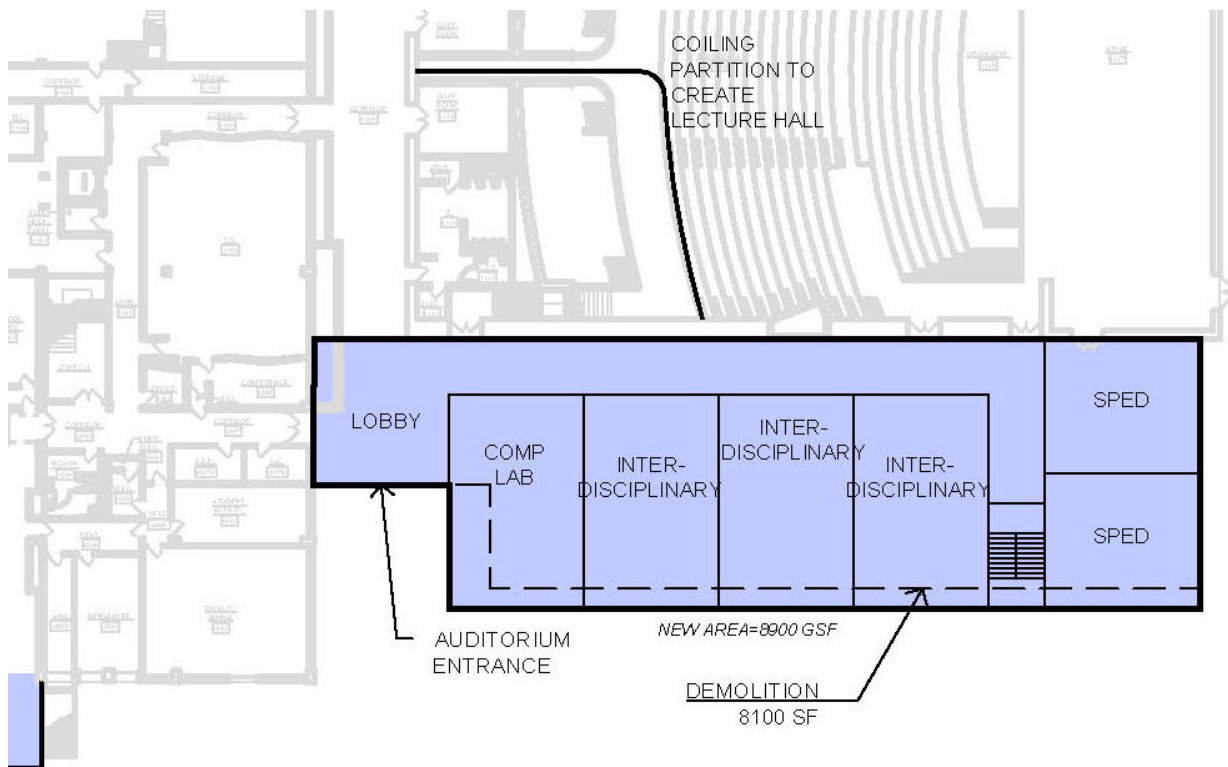
The total size of the additions (including cafeteria extension) are approximately 40,400 square feet (s.f.) based on the test fit conceptual plans shown here. This makes it more efficient than Alternative 1. (For full page plans, see the Appendix, Sec.5.7.)

This alternative concept locates all the music spaces in the one-story addition at the back of the school, and creates a new front elevation, covering the blank Auditorium wall on the upper levels.

Individual floors of the addition will be detailed on following pages.



Andover High School - Feasibility Study



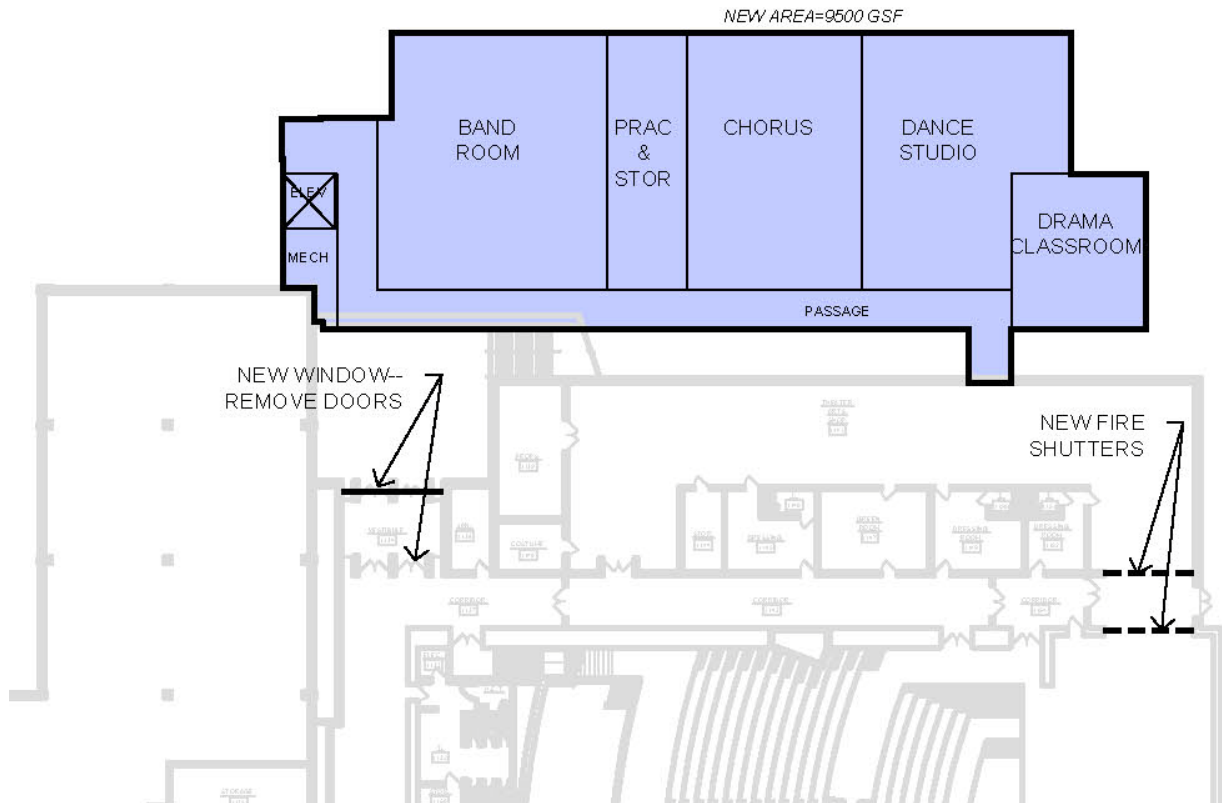
0 10 50 100 FEET

Blue=new construction areas

PROPOSED ALT 2 LEVEL 1

Level 1 addition in the front of the school contains the new lobby for the Auditorium, three Interdisciplinary classrooms, a Computer Lab, and two classrooms for Special Education. The existing music spaces would be demolished and replaced in the new construction at the back of the school, adjacent to the Auditorium.

Andover High School - Feasibility Study



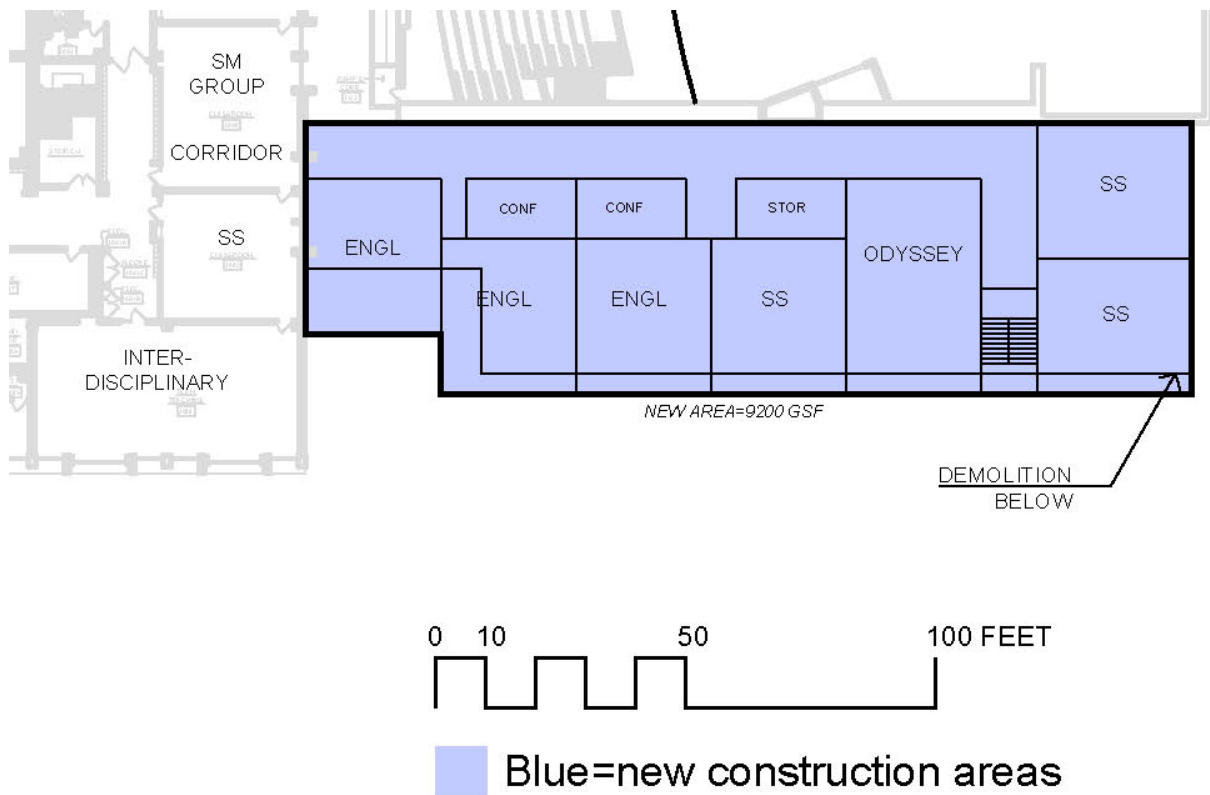
Level 1 addition at the back corner of the school, adjacent to the Auditorium, contains the new Band Room, the new Chorus Room, the new Dance Studio, and the new Drama Classroom. The lowest level of the new elevator is also located in this addition, together with its mechanical space. Since there is no floor above these spaces, the roof can be as high as necessary to create the proper volume for the music spaces.

A corridor connects the elevator, all the music spaces, and the backstage area of the Auditorium.

The Auditorium corridor will end with new windows facing the new addition, and fire shutters will be added at the end of the side corridor, allowing people to exit to the perimeter driveway.

(Note: Level 2 is an interstitial space containing no classroom spaces, so it is not included here.)

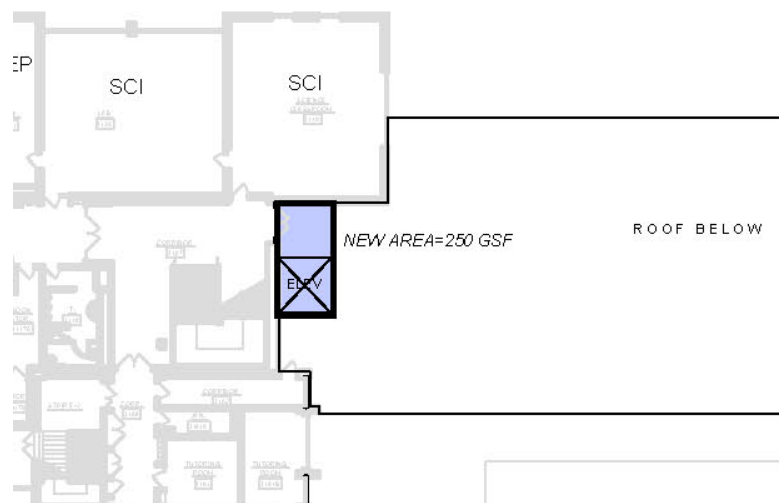
Andover High School - Feasibility Study



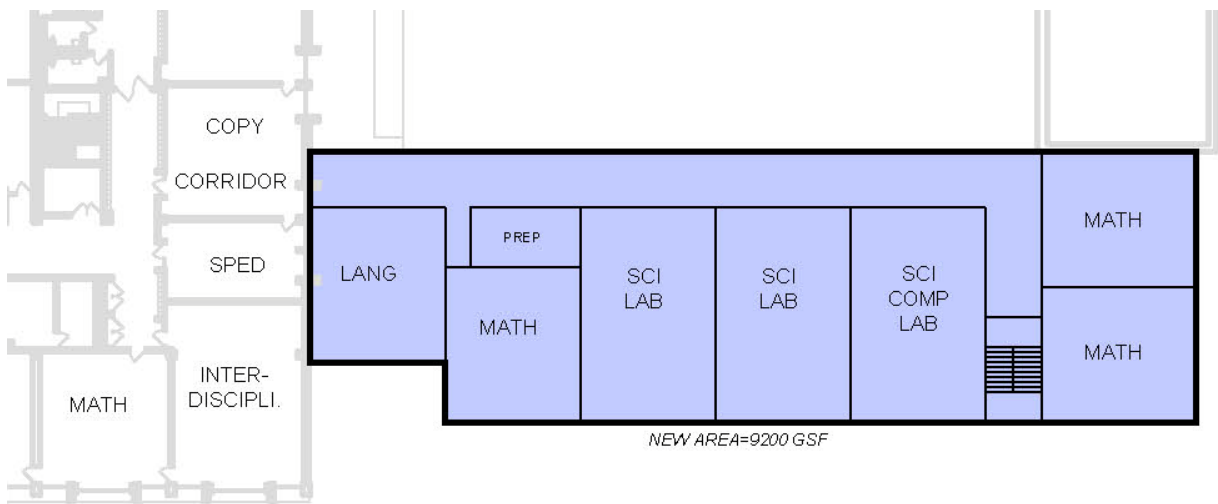
Level 3 of the addition at the front of the school contains three English classrooms, three Social Studies classrooms, two Conference/Small Group rooms, and the Odyssey Room, which houses a world culture program, part of the Social Studies department.

The new corridor connects to the existing corridor, taking space from a former classroom, which becomes a Small Group room.

At the back of the school, a very small addition at **Level 3** houses the elevator and a small connecting corridor.



Andover High School - Feasibility Study

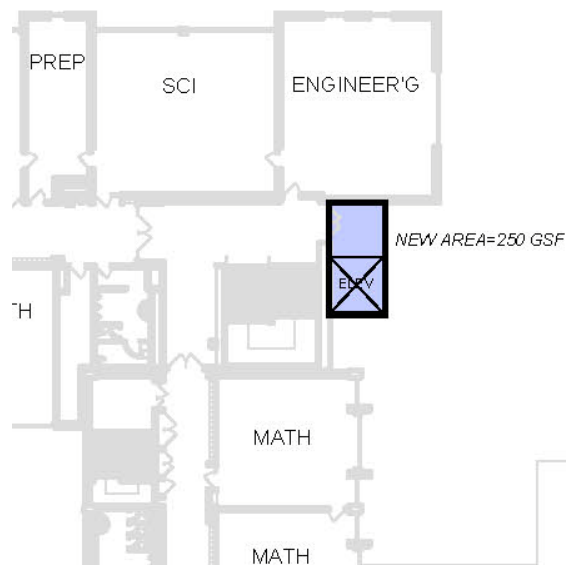


Blue=new construction areas

Level 4 of the addition at the front of the school contains two Science Labs, a Science Computer Lab, three Math classrooms, and a World Language classroom.

The new corridor connects to the existing corridor, taking space from a former classroom, which becomes a Copy room.

At the back of the school, a very small addition at **Level 4** houses the elevator and a small connecting corridor.



Andover High School - Feasibility Study

Cost Estimate of Alternative 2 for Classroom Addition

Classroom Sitework	\$683,000
Classroom Addition	\$12,674,000
Renovation for new means of egress	\$100,000
Sprinkler at Existing School	\$2,419,000
Asbestos Abatement Allowance	\$100,000
Total for Alternative 2	\$15,976,000
Kitchen & Cafeteria Total	\$5,492,000
Media Center Total	\$1,741,000
Auditorium Operable Partition Total	\$269,000
Total for All Work	\$23,478,000

For detailed cost estimate, see the A.M. Fogarty report in the Appendix, Sec. 5.8.

4

Recommendations

Andover High School - Feasibility Study

Recommendations

4.1 Comparison of Alternatives

The Base Option, Alternative 1, and Alternative 2 are equally able to provide classrooms for 1900 students. Differences between them show up in addition size, building massing, effect on the appearance, flexibility, phasing, and cost, as summarized in the chart below (CRs=classrooms).

	BASE OPTION	ALTERNATIVE 1	ALTERNATIVE 2
Description	Single classroom addition	Two classroom additions	Two additions, music at back
Number of CRs	90 total	90 total	90 total
Classroom addition size	32,000 s.f.	45,400 s.f.	40,400 s.f.
Building massing	None in front 3 levels in back	3 levels in front 3 levels in back	3 levels in front 1 level in back
Effect on appearance	Minimal impact on school, located at rear	Front addition, can improve front elevation	Front addition, can improve front elevation
Flexibility	New CRs close together, can easily be reassigned	New CRs split between two additions	New CRs close together, can easily be reassigned; not near Science dept.
Phasing	Build new Renovate	Temp music space Demolition Build new Renovate	Build new music Demolition Build new CRs Renovate
Construction Cost (incl. Cafet. and Media Center work)	\$20.5 million	\$25.1 million	\$23.5 million

BASE OPTION

The location of the classrooms addition would minimize the impact on both the existing building's massing and its appearance. Advantage: The height of the addition will match the existing science wing, and there will be no new classroom construction at the front of the school. Disadvantage: The blank wall at the Auditorium will remain visible on the front elevation.

Flexibility, in this case, refers to the capability of the classrooms to be reassigned as needs change over time. Having more classrooms in a single addition, this option would be the most flexible of the three.

Andover High School - Feasibility Study

Phasing for this option would be straightforward--new space would be built first, allowing people to move out of spaces to be renovated. There would not be a large area of demolition.

Estimated cost is lower for this option because less square footage is constructed and there is less demolition.

ALTERNATIVE 1

New classrooms would be split between the two additions in Alternative 1. The front addition will match the height of the existing front elevation, and will improve the school appearance by covering the blank wall of the Auditorium. The back addition would be smaller than in the Base Option, requiring less displacement of the existing perimeter road.

Flexibility might be less than the other options, because fewer classrooms would be located together. On the other hand, new classrooms would be located closer to the World Language department than in the Base Option.

Construction phasing for Alternative 1 would be difficult for the music department, since they will need to be moved out of their existing spaces before demolition can begin. Temporary music space will need to be found elsewhere within the existing building.

Estimated cost is higher for this option, mostly because some existing space would be demolished and rebuilt, resulting in a larger amount of new construction.

ALTERNATIVE 2

The new music spaces would be built at the back, and the new classroom addition would be built at the front of the school. This addition will match the height of the existing front elevation, and will improve the school appearance by covering the blank wall of the Auditorium. The rear addition would be only on the lowest level, allowing extra height as needed in the music spaces.

Flexibility is improved by locating the classrooms together. However, the new Science classrooms and labs are not near the existing Science wing.

Construction phasing is improved from Alternative 1, since the new Music spaces can be built before the department needs to vacate their existing spaces.

Estimated cost is lower than that of Alternative 1, because less square footage would be built. However, because existing space would be demolished and replaced with new construction, this would cost more than the Base Option.

Andover High School - Feasibility Study

4.2 Recommendations

The Base Option for the classroom addition is recommended because this concept offers the best flexibility, simple construction phasing, and the lowest estimated cost.

In the Cafeteria, it is recommended to build a new food court serving area and an expansion of the dining area to increase its capacity to 700 seats.

In the Media Center, it is recommended to increase space by relocating several existing functions, and create a Digital Commons at the heart of the school.

In the Auditorium, it is recommended to create a lecture hall by using an operable partition around a portion of the seats.

(Proposed plans are contained in the Appendix, Sec. 5.7)

5.1

Code Report



HVAC

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Electrical

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Plumbing

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Fire Protection

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Code

Andover HS

Andover, Massachusetts

Existing Building Code Report

R.W. Sullivan Engineering

The Schrafft Center
529 Main Street
Suite 203
Boston, MA 02129

617.523.8227
www.rwsullivan.com

February 28, 2014

Prepared By: Brandon C. Ingram
Reviewed By: Don E. Contois, P.E.

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Introduction

The project involves study of the existing Andover High School to determine the feasibility of renovating and constructing additions to the building. This code summary is based on proposed architectural drawings received February 12, 2014. Following is a list of applicable codes:

Code Type	Applicable Code (Model Code Basis)
Building	780 CMR: Massachusetts State Building Code, 8 th Edition (2009 International Building Code) (2009 International Existing Building Code)
Fire Prevention	527 CMR: Massachusetts Fire Prevention Regulations
Accessibility	521 CMR: Massachusetts Architectural Access Board Regulations
Electrical	527 CMR 12.00: Massachusetts Electrical Code (2014 National Electrical Code)
Elevators	524 CMR: Massachusetts Elevator Code (2004 ASME A17.1)
Mechanical	2009 International Mechanical Code (IMC)
Plumbing	248 CMR: Massachusetts Plumbing Code
Energy Conservation	2009 International Energy Conservation Code ¹

1 The 2012 IECC has been adopted and will become mandatory July 1st, 2014.

International Existing Building Code

The 2009 International Existing Building Code with Massachusetts amendments allows for 3 separate compliance methods, the Prescriptive Method (in general, altered areas must comply with the code for new construction), Work Area Method (level of compliance is based on the classification of work), and Performance Compliance Method (numerical method that allows tradeoffs for deficiencies). This report is based on the Work Area Method.

1. Work Area and Classification of Work:

The level of work is classified as Level 2. This level includes the reconfiguration of spaces, the addition or elimination of doors and windows, the reconfiguration or extension of systems, and/or the installation of additional equipment in less than 50% of the aggregate area of the building. Also, since there is an addition, the work must comply with IEBC Chapters 6, 7, & 10.

2. Occupancy Classification:

- E (Educational)
- A-3 (Gymnasium, Auditorium)

3. Construction Type:

All new work must be consistent with the existing construction type. The construction types of the existing complex are summarized below:

Building	Construction Type
Main Building	Type IB (non-combustible, 2-hour rated)
Performing Arts Building	Type IIA (non-combustible, 1-hour rated)
North Building	Type IIB (non-combustible, no rating)
Gymnasium	Type IIB (non-combustible, no rating)

4. Height and Area Limitations:

Portions of the building that are undergoing an addition must comply with the area limitations for new construction (IEBC 1002.2).

Since the main portion of the building is Type IB construction, the area of the cafeteria addition is not limited (780 CMR Table 503).

The academic addition to the north building must comply with the height and area requirements for Use Group E based on Type IIB construction (below).

Code Reference	Type IIB – Use Group E	
	Height	Area
<u>780 CMR Table 503:</u> Tabular Value	2 St. (55 ft)	14,500 ft ²
<u>780 CMR Section 504.2:</u> Sprinkler Height Increase	1 St. (20 ft)	-
<u>780 CMR Section 506.2</u> Frontage Increase (50% Open)	-	3,625 ft ²
<u>780 CMR Section 506.3:</u> Sprinkler Area Increase	-	29,000 ft ²
Height and Area Allowed	3 St. (75 ft)	47,125 ft²
Height and Area (Existing + Addition)	2 St.	34,000 ft²

5. Fire Resistance Ratings:

The following table summarizes the required fire resistance ratings for the building elements of Type IB, IIA, and IIB construction, based on 780 CMR Table 601 and other applicable code provisions:

Type IB – Cafeteria Addition

Building Element	Fire Resistance Rating (Hrs)	Opening Protectives (Hrs)
Primary Structural Frame ^A	2 ^B	-
Exterior Bearing Walls including columns along the exterior wall	2 ^B	-
Exterior Non-Bearing Walls	0	
Interior Bearing Walls	2	-

Floor Construction	2 ^B	-
Roof Construction	1	-

- A. Includes beams, trusses, floor members, etc. having a direct connection to the columns (780 CMR 202).
B. Not less than the rating supported (780 CMR 707.5).

Type IIA

Building Element	Fire Resistance Rating (Hrs)	Opening Protectives (Hrs)
Primary Structural Frame ^A	1 ^B	-
Exterior Bearing Walls including columns along the exterior wall	1 ^B	-
Exterior Non-Bearing Walls	0	-
Interior Bearing Walls	1	-
Floor Construction	1 ^B	-
Roof Construction	1	-

- A. Includes beams, trusses, floor members, etc. having a direct connection to the columns (780 CMR 202).
B. Not less than the rating supported (780 CMR 707.5).

Type IIB – Academic Addition

Building Element	Fire Resistance Rating (Hrs)	Opening Protectives (Hrs)
Primary Structural Frame ^A	0 ^B	-
Exterior Bearing Walls including columns along the exterior wall	0 ^B	-
Exterior Non-Bearing Walls	0	-
Interior Bearing Walls	0	-
Floor Construction	0 ^B	-
Roof Construction	0	-

- A. Includes beams, trusses, floor members, etc. having a direct connection to the columns (780 CMR 202).
B. Not less than the rating supported (780 CMR 707.5).

6. Exterior Wall Openings & Fire Resistance Rating:

The exterior wall rating requirements and opening limitations are based on the fire separation distance for each wall. The fire separation distance is measured perpendicular to the exterior wall to the centerline of a public street, an interior lot line, or an imaginary lot line between two buildings on the same lot (780 CMR 702.0). For Type IIB construction, the allowable area of openings is not limited and the exterior wall is not required to be rated where the fire separation distance is greater than 10 ft (780 CMR Table 602 and Table 705.8). Note that

openings are not permitted where the fire separation distance is less than 3 ft. Also, where the fire separation distance is 10 ft or less, the exterior walls must be rated for exposure to fire from both sides (780 CMR 705.5).

Since the north building including the academic addition is separated from the rest of the complex by a fire wall, an imaginary lot line will need to be drawn between the addition and the performing arts building to evaluate the exterior wall requirements. Since the existing building wall is likely 2-hour rated (masonry) and has no openings, the imaginary lot line can be located in close proximity to the existing building. Therefore, the exterior wall of the addition will not require a fire resistance rating and can have unlimited openings assuming the buildings will be at least 10 feet apart.

7. Vertical Openings:

All existing vertical openings in the work area connecting two or more floors must be enclosed with 1-hour rated construction and approved opening protectives unless the openings meet one of the exceptions in IEBC 703.2.1. New vertical openings are required to comply with 780 CMR 708.2.

All vertical openings appear to be enclosed.

8. Interior Finishes:

The existing interior finish of walls and ceilings in the work area must comply with the code requirements for new construction (IEBC 703.4). All newly installed wall and ceiling finishes, and interior trim materials must also comply with 780 CMR Table 803.9 (IEBC 602.1, 602.2, 602.3). The requirements are summarized below:

Walls & Ceilings (IBC Table 803.9)

Use Group:	A-3	E
Exit Enclosures	Class B	Class B
Exit Access Corridors	Class B	Class C
Rooms & Enclosed Spaces	Class C	Class C

9. Means of Egress:

The means of egress including the number of exits and egress capacity must be sufficient for the number of occupants on all renovated floors (IEBC MA Amendment Section 102.2.2.1).

The existing building appears to be provided with sufficient egress capacity. The academic addition will be provided with an exit stair, which will provide adequate egress capacity for the additional occupant load.

General Egress Requirements

The means of egress in the addition must comply with the code for new construction; the remaining portions of the building must maintain or improve their current level of egress (IEBC 604.1). The requirements for new construction include the following provisions:

- Maximum exit access travel distance must be less than 250 ft (780 CMR Table 1016.1).
- Maximum dead-end corridor length must be less than 50 ft or 2.5 times the least width of space (780 CMR 1018.4).
- All rooms or spaces with an occupant load greater than 50 people or a travel distance over 75 ft must be provided with two egress doors swinging in the direction of egress and illuminated exit signs at each exit (780 CMR Sections 1015.1, 1008.1.2, & 1011.1).

Note that at least one door from the academic addition must swing into the existing building.

- The clear width of all doors must be at least 32" (780 CMR 1008.1.1).
- All means of egress lighting and exit signs throughout the building must be provided with an emergency power supply to assure continued illumination for not less than 1.5 hours in case of primary power loss (780 CMR 1006.1 & 1011.1).
- Remote means of egress must be separated by $\frac{1}{3}$ of the diagonal dimension of the room or space they serve (780 CMR 1015.2.1). The distance between must be measured in a straight line between exit doors.
- All exits must discharge to the exterior of the building except that a maximum of 50% of the number and capacity of the exit enclosures are allowed to exit through areas on the level of discharge if the exit enclosures discharge to a free and unobstructed path of travel to an exterior exit that is readily visible from the discharge of the exit enclosure; the entire area of the level of exit discharge is separated from areas below by construction consistent with the rating of the exit enclosure; and the egress path and all areas open to the egress path on the level of exit discharge must be fully sprinklered (780 CMR 1027.1).
- Any new passenger elevator in the additions must be sized to accommodate the loading and transportation of an ambulance gurney or stretcher sized 24" wide by 84" long with 5" radius corners (524 CMR 17.40(1)).

10. Required Fire Protection Systems:

The following fire protection systems are required in the areas notes:

- Automatic sprinkler system throughout the building (MGL c. 148 s. 26G)

Note that MGL Chapter 148 Section 26G requires sprinkler protection throughout the entire building, regardless of the fire wall separations.

- Fire alarm system in all work areas (IEBC 704.4.1.1)
- Fire extinguishers (527 CMR 10.02)

M.G.L. Chapter 148 Section 26G

Since the building is over 7,500 gross square feet in area, it is subject to the requirements of M.G.L. Chapter 148 Section 26G. These amendments require the entire building to be provided with sprinkler protection if there is an addition or if the renovations are considered "major".

Renovations are considered major depending on the type of work and the scope / cost of work. The following are general guidelines established by the board to be used to determine if the scope or the cost of the planned alterations are major:

- 1. Major alterations are reasonably considered major in scope when such work over a 5 year period affects **33% or more of the total gross square footage of the building** (measured from the outside walls, regardless of firewalls).*
- 2. Major alterations are reasonably considered major in scope or expenditure, when the total cost of the work over a 5 year period, excluding costs relating to sprinkler installation, is equal to or greater than **33% of the assessed value of the building**, as of the date of permit application.*

Major alterations would include work such as the demolition or reconstruction of existing ceilings, sub flooring, walls, stairways, doors, or the removal or relocation of a significant portion of the building's HVAC, plumbing, or electrical systems. Cosmetic work such as painting or installing / replacing carpeting would be considered minor and would not trigger compliance with this law.

11. Energy Code Provisions for Existing Buildings

The building is subject to the 2009 International Energy Conservation Code (IECC) including the amendments contained in 780 CMR Chapter 13. Alternatively, the provisions of ASHRAE 90.1-2007 can be met in lieu of the IECC. All new or altered systems or portions thereof within the existing building must comply with the code requirements applicable to new construction without requiring the unaltered portions to be upgraded (IECC 101.4.3).

The Massachusetts Stretch Code as adopted by Andover does not apply to altered commercial buildings since the addition is less than 30% of the existing conditioned floor area (780 CMR Appendix AA 501.1.1). However, note that the 2012 IECC has been adopted and will become mandatory July 1, 2014. The 2012 IECC provisions for commercial energy conservation are similar to those of the current MA Stretch Energy Code.

12. Ventilation Requirements

All reconfigured spaces must be provided with existing mechanical ventilation not less than 5cfm of outdoor air per person and not less than 15 cfm of ventilation air per person, or natural ventilation as required by the International Mechanical Code (i.e. exterior openings equal to 4% of floor area) (IEBC Section 709).

13. Structural Provisions for Existing Buildings

Any structural alterations must be evaluated by a registered structural engineer to determine compliance with the IEBC.

14. Accessibility for Persons with Disabilities

Massachusetts Architectural Access Board Regulations

Alterations to the building must comply with the requirements of the Massachusetts Architectural Access Board Regulations (521 CMR). For existing building alterations the requirements of 521 CMR are based on the cost of the proposed work:

- A. If the cost of the proposed work is **less than \$100,000**, only the new work must comply.
- B. If the cost of the proposed work is **greater than \$100,000** then all new work must comply and the existing building must include an accessible public entrance, toilet room, telephone and drinking fountain (if public phones and drinking fountains are provided) (521 CMR Section 3.3.1(b)). Exempt work when calculating the cost of work includes roof repair or replacement, window repair or replacement, and repointing and masonry repair work unless the exempt work exceeds \$500,000.
- C. If the cost of the proposed work is **greater than 30% of the full and fair cash value** of the existing building, the entire building is required to comply with 521 CMR (521 CMR Section 3.3.2). There is no exempt work, i.e. the entire project costs apply to determining the 30% criteria.

The cost of all work performed on a building in any 36 month period must be added together in determining the applicability of 521 CMR (521 CMR Section 3.5). The full and fair cash value of the existing building is determined by using the 100% equalized assessed value of the building on record with the city assessor's office.

According to the Andover assessor's records, the building has a value of \$25,130,500. Therefore, full compliance with 521 CMR will be triggered if the cost of renovations in 3-year period exceeds \$7,539,150.

Since the building will not trigger the 30% threshold, full compliance with 521 CMR will not be required. The building already has an accessible entrance, toilet rooms, and drinking fountains; therefore only the new work will need to comply with 521 CMR.

Americans with Disabilities Act Guidelines

The ADA Guidelines are not enforced by the Commonwealth of Massachusetts, they can only be enforced through a civil lawsuit or complaint filed with the U.S. Department of Justice. Compliance with the ADA Guidelines is triggered by renovations to the existing building. All renovations to the building must be made to ensure that, to the maximum extent feasible, the altered portions of the facility are readily accessible to and usable by individuals with disabilities (28 CFR Part 36 Section 36.402(a)). Alterations made to provide an accessible path of travel to altered areas and accessible facilities (i.e. provide accessible toilet facilities) are not required if the cost exceeds 20% of the total cost of the alteration (28 CFR Part 36 Section 36.403(f)). However, if the cost to meet these accessibility requirements does exceed 20%, alterations are still required to the maximum extent that the area can be made accessible without exceeding the 20% criteria (28 CFR Part 36 Section 36.403(g)). The ADA also contains less stringent dimensional requirements for some building elements in an existing building where it is infeasible to meet the requirements for new construction (ADA Section 4.1.6).

5.2

Structural Assessment

ANDOVER HIGH SCHOOL

Andover, Massachusetts

Structural Assessment

December 11, 2013

PURPOSE

The purpose of this report is to describe, in broad terms, the structure of the existing building; to comment on the condition of the existing building; and on the feasibility of renovation and expansion of the school.

SCOPE

1. Description of existing structure.
2. Comments on the existing condition.
3. Comments on the feasibility of renovation and expansion.

BASIS OF THE REPORT

This report is based on our visual observations during our site visit on December 11, 2013, review of the structural drawings of the additions prepared by Engineers Design Group, Inc. dated September 8, 1994, and the geotechnical report dated May 27, 1994.

During our site visit, we did not remove any finishes or take measurements, so our understanding of the structure is limited to the available drawings and observations of the exposed structure and the exterior facade.

BUILDING DESCRIPTION

General

The school is located on Shawsheen Road in Andover, Massachusetts. The original school is essentially a three story concrete structure. Since its original construction, two major additions have been constructed. The additions are essentially concrete slab on metal deck floors with steel framing. The school is constructed in the shape of a series of rectangles. The New Field House is located on the southeast wing; the original auditorium is located on the northwest wing; and the core original and additional three story academic spaces are located in between.

Original Construction

The first, second and third level structure consist of elevated concrete floors supported on concrete columns and concrete spread footings. There is a partial basement under the first level and a crawlspace under the remaining areas of the footprint of the first level. The original gymnasium and auditorium are cast in place concrete framing. The mezzanine is framed with miscellaneous steel members and a concrete slab. The lateral load resisting systems consists of concrete masonry walls.

1990's Field House (Area A)

The field house roof is a 3 inch deep acoustical metal deck roof supported on 72 inch deep open web joists spanning between steel columns. The columns are tied with structural steel spandrel beams along the perimeter of the roof. The lateral load resisting systems is a combination of semi-rigid structural steel moment frames and concrete masonry walls.

1990's Entry and Mechanical Areas (Area B)

The entry area between the Field House, and the original gymnasium and academic wing is a 1 1/2 inch deep acoustical metal deck roof supported on structural steel beams spanning between structural steel girders and steel columns. The roof at the entry is acoustical metal deck on arching open web steel trusses. The second floor is a 4 1/2 inch deep concrete slab on metal deck supported on structural steel beams spanning between steel girders and steel columns. The interior and exterior columns are supported on reinforced concrete spread footings. The exterior walls are supported on reinforced concrete foundation walls supported on continuous reinforced concrete strip footings. The lateral load resisting systems is a combination of structural steel braced frames and concrete masonry walls.

1990's Academic Wing (Areas D and E)

The new academic wing roof is a 1 1/2 inch deep metal deck roof supported by structural steel beams spanning between steel columns. The second floor is a 4 1/2 inch deep concrete slab on metal deck supported on structural steel beams spanning between steel girders and steel columns. The interior and exterior columns are supported on reinforced concrete spread footings. The exterior walls are supported on reinforced concrete foundation walls supported on continuous reinforced concrete strip footings. The lateral load resisting systems is a combination of structural steel braced frames and semi-rigid moment frames.

EXISTING CONDITIONS

Based on our observations, the school structure is functioning adequately.

We observed minor cracks in the exterior façade in various locations. We observed that some of the brick had stained or discolored from the absorption of water over time.

We did not observe any signs of foundation settlement; nor did we observe any excessive vibration on the supported floors due to footfall. We observed small cracks in the exterior concrete foundation walls, interior masonry walls, and concrete slabs on grade at a various locations, these cracks do not appear to be a structural concern. We did not observe anchorage of the tops of interior masonry walls to the structure in the original construction.

FEASIBILITY OF RENOVATION AND EXPANSION OF THE STRUCTURE

Depending on the scope of the renovations to the school, it may be feasible to make modifications to the existing structure without requiring full compliance with the code requirements for new construction. We would recommend that any additions, if planned, be separated from the existing structure by way of expansion joints.

PRIMARY STRUCTURAL CODE ISSUES RELATED TO THE EXISTING STRUCTURE

If any repairs, renovations, additions or change of occupancy or use are made to the existing structures, a check for compliance with 780 CMR, Chapter 34 "Existing Structures" (Massachusetts Amendments to The International Existing Building Code 2009) of the Massachusetts Amendments to the International Building Code 2009 (IBC 2009) and reference code "International Existing Building Code 2009" (IEBC

2009) is required. The intent of the IEBC and the related Massachusetts Amendments to IEBC is to provide alternative approaches to alterations, repairs, additions and/or a change of occupancy or use without requiring full compliance with the code requirements for new construction.

The IEBC provides three compliance methods for the repair, alteration, change of use or additions to an existing structure. Compliance is required with only one of the three compliance alternatives. Once the compliance alternative is selected, the project will have to comply with all requirements of that particular method. The requirements from the three compliance alternatives cannot be applied in combination with each other.

The three compliance methods are as follows:

1. Prescription Compliance Method.
2. Work Area Compliance Method.
3. Performance Compliance Method.

Comment

The approach is to evaluate the compliance requirements for each of the three methods and select the method that would yield the most cost effective solution for the structural scope of the project. The selection of the compliance method may have to be re-evaluated after the impact of the selected method is understood and after analyzing the compliance requirements of the other disciplines, Architectural, Mechanical, Fire Protection, Electrical and Plumbing.

Since the existing buildings are un-reinforced masonry wall structures, the analysis and reinforcement of the existing structures would be governed by the requirements of Appendix A1 "Seismic Strengthening Provisions for Un-reinforced Masonry Bearing Wall Buildings" in the IEBC.

Prescriptive Compliance Method

In this method, compliance with Chapter 3 of the IEBC is required. As part of the scope of this report, the extent of the compliance requirements identified are limited to the structural requirements of this chapter.

Additions

Based on the project scope, the following structural issues have to be addressed:

- All additions should comply with the code requirements for new construction in the IBC.
- For additions that are not structurally independent of an existing structure, the existing structure and its addition, acting as a single structure, shall meet the requirements of the code for new construction for resisting lateral loads, except for the existing lateral load carrying structural elements whose demand-capacity ratio is not increased by more than 10 percent, these elements can remain unaltered.
- Any existing gravity, load-carrying structural element for which an addition or its related alterations causes an increase in the design gravity load of more than 5 percent shall be strengthened, supplemented or replaced.

Alterations

- Any existing gravity, load-carrying structural element for which an addition or its related alterations causes an increase in the design gravity load of more than 5 percent shall be strengthened, supplemented or replaced.
- For alterations that would increase the design lateral loads or cause a structural irregularity or decrease the capacity of any lateral load carrying structural element, the structure of the altered building shall meet the requirements of the code for new construction, except for the existing lateral load carrying structural elements whose demand-capacity ratio is not increased by more than 10 percent, these elements can remain unaltered.

Work Area Compliance Method

In this method, compliance with Chapter 4 through 12 of the IEBC is required. As part of the scope of this report, the extent of the compliance requirements identified are limited to the structural requirements of these chapters.

In this method, the extent of alterations has to be classified into LEVELS OF WORK based on the scope and extent of the alterations to the existing structure. The LEVEL OF WORK can be classified into LEVEL 1, LEVEL 2 or LEVEL 3 Alterations. In addition, there are requirements that have to be satisfied for additions to the existing structure.

The extent of the renovations (includes Architectural, FP and MEP renovations) for this project will exceed 50 percent of the aggregate area of each of the buildings, thus the LEVEL OF WORK for this project would be classified as LEVEL 3 Alterations. This would require compliance with provision of Chapter 6, 7 and 8 of the IEBC. If the scope of the project includes new additions to the existing structure; this would trigger compliance with provisions in Chapter 10 of the IEBC.

Level 3 Alterations

- Any existing gravity, load-carrying structural element for which an alteration causes an increase in the design gravity load of more than 5 percent shall be strengthened, supplemented or replaced.
- For alterations where more than 30 percent of the total floor area and roof areas of a building or structure have been or proposed to be involved in structural alterations within a 12 month period, the evaluation and analysis shall demonstrate that the altered building complies with the full design wind loads as per the code requirements for new construction and with reduced IBC level seismic forces.
- For alterations where not more than 30 percent of the total floor and roof areas of a building are involved in structural alterations within a 12 month period, the evaluation and analysis shall demonstrate that the altered building or structure complies with the loads at the time of the original construction or the most recent substantial alteration (more than 30 percent of total floor and roof area). If these alterations increase the seismic demand-capacity ratio on any structural element by more than 10 percent, that particular structural element shall comply with reduced IBC level seismic forces.
- For alterations that involve structural alterations to more than 30 percent of the total floor and roof area of a building within a 12 month period, the evaluation and analysis shall demonstrate

that the altered building structure complies with IBC for wind loading and with reduced IBC level seismic forces.

- For alterations where more than 25 percent of the roof is replaced for buildings assigned to seismic design category B, C, D, E or F, all un-reinforced masonry walls shall be anchored to the roof structure and un-reinforced masonry parapets shall be braced to the roof structure.

Additions

- All additions shall comply with the requirements for the code for new construction in the IBC.
- Any existing gravity, load-carrying structural element for which an addition or its related alterations cause an increase in design gravity load of more than 5 percent shall be strengthened, supplemented or replaced.
- For additions that are not structurally independent of any existing structures, the existing structure and its additions, acting as a single structure, shall meet the requirements of the code for new construction in the IBC for resisting wind loads and IBC Level Seismic Forces (may be lower than loads from the Code for New Construction in the IBC), except for small additions that would not increase the lateral force story shear in any story by more than 10 percent cumulative. In this case, the existing lateral load resisting system can remain unaltered.

Performance Compliance Method

Following the requirements of this method for the alterations and additions may be onerous on the project because this method requires that the altered existing structure and the additions meet the requirements for the code for new construction in the IBC.

PARTICULAR REQUIREMENTS OF COMPLIANCE METHODS

For our project, in order to meet compliance with one of the two compliance methods “Prescriptive Compliance Method” or the “Work Area Compliance Method”, we have to address the following:

Prescriptive Compliance Method

Additions

The proposed additions would be designed structurally independent of the existing structures, thus, would not impart any additional lateral loads on the existing structure.

If the proposed alterations are such that the alterations increase the design lateral loads on the existing building or cause any structural irregularity or decrease the lateral load carrying capacity of the building, the structure of the altered building shall meet the requirements of the Code for New Construction in the IBC.

If the proposed additions increase the design gravity load on portions of the existing roof members, these members would have to be reinforced and this incidental structural alteration of the existing structures would have to be accounted for in the scope of the alterations to the existing schools and would trigger requirements for alterations.

Alterations

Alterations that would increase the design gravity loads by more than 5 percent on any structural members would have to be reinforced.

If the proposed alterations of the structures increase the effective seismic weight on the existing structures due to the greater snow loads from the drifted snow against any proposed additions, or, by addition of equipment on the roof, the increase of the effective seismic weight from the drifted snow and the equipment would require that the existing lateral load resisting system comply with the requirements of the code for new construction in the IBC and it would increase the demand-capacity ratio on certain structural elements of the existing lateral load resisting system.

Work Area Compliance Method

Level 3 Alterations

If the proposed structural alterations of an existing structure are less than 30 percent of the total floor and roof areas of the existing structure, we have to demonstrate that the altered structure complies with the loads applicable at the time of the original construction and that the seismic demand-capacity ratio is not increased by more than 10 percent on any existing structural element. Those structural elements whose seismic demand-capacity ratio is increased by more than 10 percent shall comply with reduced IBC level seismic forces. The percentage increase in seismic demand-capacity ratio on any particular structural element from the added snowdrift load against the proposed addition would be fairly low, thus, this would not have any major impact on the existing lateral load resisting system, though we would have to verify that the increase in seismic demand-capacity ratio on any of those particular structural elements is not greater than 10 percent.

If the proposed structural alterations of an existing structure exceed 30 percent of the total floor and roof areas of an existing structure, we have to demonstrate that the altered structure complies with the IBC for wind loading and with reduced IBC level seismic forces.

The seismic design category (SDC) of the existing structures is 'B'; thus, the replacement of the existing roofs would trigger anchorage of un-reinforced masonry walls to the roof structures and bracing of un-reinforced masonry parapets to the roof structures. All un-reinforced masonry walls in the existing schools will have to be identified. These un-reinforced masonry walls are required to be anchored to the roof structures. Since there are no existing un-reinforced masonry parapets, this requirement does not have any impact on the structural scope of the project.

Additions

The proposed additions would be designed structurally independent of the existing structures, thus, they would not impart any additional lateral loads on the existing structures.

Comment

The compliance requirements of the two methods, in most respects, are very similar. The Work Area Compliance Method would trigger anchorage of un-reinforced masonry walls, if re-roofing of the existing structures is included as part of the scope for this project. The Prescriptive Compliance Method would require that the existing lateral load resisting systems meet the requirements of the code for new construction of the IBC, even for small increases of design lateral loads. We are required to comply with requirements of Appendix A1 of IEBC for either method, which requires anchorage of all existing masonry walls. Based on this, we would recommend the Work Area Compliance Method for the project.

SUMMARY

The existing school structure appears to be performing adequately. The majority of the structural components that are visible appear to be in sound condition.

The half-height masonry walls in the basement do not extend to the underside of structure above. These walls will have to be adequately braced or reconstructed.

If the proposed renovations are minimal, it is likely that no structural upgrades will be required for the existing structure; however if the proposed renovations are extensive in scale, the structure may have to be upgraded to meet the requirements of the code for new construction. This may require addition of some shear walls, connecting the floor and roof diaphragms to the existing masonry walls, clipping of non-structural masonry walls to the structure. All of the existing masonry walls would have to be adequately connected to the roof and floor structure.

ANDOVER HIGH SCHOOL

Andover, Massachusetts

Proposed Additions and Renovations Base Scheme

March 7, 2014

PROPOSED SCOPE

The proposed scheme calls for interior renovations to the existing building. This scheme calls for architectural, mechanical, electrical and plumbing renovations. Minimal structural modifications would be required within the existing building. The kitchen area would require reconfiguration of existing partition walls and some concrete masonry walls. New skylights are proposed in the existing library roof, and new openings as required in the existing masonry walls for duct work and piping. Further investigation and study required to determine the full extent of the penetrations.

The proposed additions would be located at the front and back of the existing school. The first addition would be a single story expansion of the existing Dining Room. The second addition would be a multi-story addition to the existing classroom wing.

PRIMARY STRUCTURAL CODE ISSUES RELATED TO THE RENOVATIONS TO THE EXISTING STRUCTURE

As required by the Massachusetts State Building Code, we have made a check for compliance with requirements of Chapter 34 "Existing Structures" of the MSBC which are amendments to the IBC 2009 and IEBC 2009.

We recommend the Prescriptive Compliance Method for this project. Based on the scope of the project, there are no additional structural requirements that would be triggered for compliance with the above referenced codes. Based on the scope of the renovations, no clipping of the existing masonry walls is required.

The proposed classroom wing addition would be separated by an expansion joint from the existing structure. The Dining Room expansion would be attached to the existing structure

PROPOSED STRUCTURAL SCHEME

RENOVATIONS TO EXISTING

NEW SKYLIGHTS IN THE EXISTING LIBRARY ROOF

Further investigation and study is required to determine the full extents of work required for the proposed new openings in the existing library roof structure. We have determined by analysis that it is feasible to create openings in the concrete roof slab for new skylights. Depending on the extents of the proposed skylights, the existing diaphragm would have to be reinforced within the proposed openings by creating a structural steel horizontal truss. Allow for

twelve (12) pounds per square foot of structural steel for this scope. Additional steel would be required to construct the curbs for the skylights.

KITCHEN RENOVATIONS

The kitchen area would require reconfiguration of existing partition walls and some concrete masonry walls, and cutting and patching of the existing slab-on-grade for underground plumbing.

AUDITORIUM COILING DOOR

A new coiling door is proposed in the existing auditorium. This partition would be supported by the existing roof structure and some new supplemental steel.

NEW SUBSTRUCTURE

TYPICAL FOUNDATIONS

Based on the foundations of the existing structure and the information obtained from the existing structural documents, the columns of the proposed structure would bear on reinforced cast in place concrete spread footings and the perimeter walls would bear on continuous reinforced cast in place concrete foundation walls. With the assumed bearing capacity of the soil of two (2) tons per square foot, a typical interior column footing would be 8'-0" x 8'-0" x 24" deep in two story areas and 6'-0" x 6'-0" x 18" deep in the single story areas. The perimeter foundation walls would be 14" to 16" thick, on 24" to 36" wide continuous reinforced concrete strip footings, extending a minimum of 4'-0" below finished grade.

The existing site to the rear of the building is sloping. The proposed scheme calls for portions of the first floor to be below exterior grade. This difference in grade would require portions of the basement exterior walls to be cantilevered reinforced cast-in-place concrete foundation walls to resist soil pressures. Some walls would be 20 " thick, supported on 7'-0" wide x 2'-0" thick continuous reinforced concrete footings.

SLAB ON GRADE

Based on the existing school construction, the lowest level of the proposed building would be a four (4) inch thick concrete slab on grade reinforced with welded wire fabric over a vapor barrier on two (2) inch thick rigid insulation on eight (8) inches of compacted granular structural fill and a base course of eight (8) inches of compacted gravel.

NEW SUPERSTRUCTURE

The proposed superstructure for the classroom addition would be comprised of one and a half elevated floors and a roof. The addition to the existing Dining Room would be a single story structure.

FLOOR CONSTRUCTION

Typical Floor Construction

Typical floor construction would be a 5 1/4" light weight concrete on composite metal deck slab reinforced with welded wire fabric on wide flange steel beams spanning between steel girders and columns. The weight of the structural steel is estimated to be thirteen (13) pounds per square foot for the typical framing.

ROOF CONSTRUCTION

Typical Roof Construction

The roof construction would be galvanized, corrugated 1 1/2" deep, Type 'B' metal roof deck spanning between wide flanged steel beams and girders. At locations of roof supported mechanical equipment, a concrete slab would be

provided similar to the typical supported floor slab. The weight of the structural steel is estimated to be twelve (12) pounds per square foot.

Low Roof Structure at the Dining Room Expansion

The roof would be the typical roof construction detailed above. The weight of the structural steel is estimated to be thirteen (13) pounds per square foot.

VERTICAL FRAMING ELEMENTS

Columns

Columns would be hollow structural steel columns. Typical columns would be HSS 8 x 8.

Typical Lateral Load-Resisting System

The proposed classroom wing addition structure would be separated by way of expansion joints from the existing building. The lateral load resisting system for the structure housing the classrooms would consist of concentric steel braced frames comprised of diagonal hollow structural steel sections between select columns.

The low roof structure at the Dining Room expansion would be positively attached to the existing concrete 2nd Floor with no expansion joint. The addition would be comprised of supplementary stabilizing steel moment frames.

PRECAST CONCRETE ALTERNATE SCHEME FOR THE CLASSROOM WING ADDITION

An alternate structure for the new classroom wing at the rear of the building has been proposed.

NEW SUBSTRUCTURE

TYPICAL FOUNDATIONS

The wall panels of the proposed structure would bear on continuous reinforced cast in place concrete foundation walls. With the assumed bearing capacity of the soil of two (2) tons per square foot, the foundation walls would be 14" to 16" thick, on 24" to 36" wide continuous reinforced concrete strip footings. The strip footings would extend a minimum of 4'-0" below finished grade at the exterior conditions.

SLAB ON GRADE

The slab on grade for this proposed alternate structure would be as noted previously in this report: a four (4) inch thick concrete slab on grade reinforced with welded wire fabric over a vapor barrier on two (2) inch thick rigid insulation on eight (8) inches of compacted granular structural fill and a base course of eight (8) inches of compacted gravel.

NEW SUPERSTRUCTURE

The proposed alternate superstructure for the classroom addition would be comprised of one and a half elevated floors and a roof.

FLOOR AND ROOF CONSTRUCTION

Typical floor and roof construction would be ten (10) inch thick precast prestressed concrete hollow-core planks (the floor would receive a two (2) inch concrete topping), spanning between exterior and interior precast concrete load-bearing walls.

VERTICAL FRAMING ELEMENTS

The exterior walls would be twelve (12) inch to sixteen (16) inch thick insulated precast concrete panels. One of the two corridor walls would be 12" thick precast concrete wall panel. The classroom demising walls would be twelve (12) inch thick precast concrete shear walls.

+ + END OF REPORT + +

DRAFT



ANDOVER HIGH SCHOOL

Andover, Massachusetts

Proposed Additions and Renovations Alternate #1 Scheme

March 7, 2014

PROPOSED SCOPE

The proposed scheme calls for interior renovations to the existing building. This scheme calls for architectural, mechanical, electrical and plumbing renovations. Minimal structural modifications would be required within the existing building. The kitchen area would require reconfiguration of existing partition walls and some concrete masonry walls. New skylights are proposed in the existing library roof, and new openings as required in the existing masonry walls for duct work and piping. Further investigation and study required to determine the full extent of the penetrations.

The proposed additions would be located at the front and back of the existing school. The first addition would be a single story expansion of the existing Dining Room. The second addition would be a multi-story addition to the existing classroom wing. The third addition would require the existing Choral and Band rooms on the front of the building to be demolished and replaced with a new multi-story addition.

PRIMARY STRUCTURAL CODE ISSUES RELATED TO THE RENOVATIONS TO THE EXISTING STRUCTURE

As required by the Massachusetts State Building Code, we have made a check for compliance with requirements of Chapter 34 "Existing Structures" of the MSBC which are amendments to the IBC 2009 and IEBC 2009.

We recommend the Prescriptive Compliance Method for this project. Based on the scope of the project, there are no additional structural requirements that would be triggered for compliance with the above referenced codes. Based on the scope of the renovations, no clipping of the existing masonry walls is required.

The proposed classroom wing addition would be separated an expansion joint from the existing structure. The Dining Room expansion would be attached to the existing structure. The third addition replacing the existing Choral and Band rooms would be separated by an expansion joint from the existing structure.

PROPOSED STRUCTURAL SCHEME

RENOVATIONS TO EXISTING

NEW SKYLIGHTS IN THE EXISTING LIBRARY ROOF

Further investigation and study is required to determine the full extents of work required for the proposed new openings in the existing library roof structure. We have determined by analysis that it is feasible to create openings in the concrete roof slab for new skylights. Depending on the extents of the proposed skylights, the existing diaphragm would have to be reinforced within the proposed openings by creating a structural steel horizontal truss. Allow for twelve (12) pounds per square foot of structural steel for this scope. Additional steel would be required to construct the curbs for the skylights.

KITCHEN RENOVATIONS

The kitchen area would require reconfiguration of existing partition walls and some concrete masonry walls.

AUDITORIUM COILING DOOR

A new coiling door is proposed in the existing auditorium. This partition would be supported by the existing roof structure and some new supplemental steel.

NEW SUBSTRUCTURE

TYPICAL FOUNDATIONS

Based on the foundations of the existing structure and the information obtained from the existing structural documents, the columns of the proposed structures would bear on reinforced cast in place concrete spread footings and the perimeter walls would bear on continuous reinforced cast in place concrete foundation walls. With the assumed bearing capacity of the soil of two (2) tons per square foot, a typical interior column footing would be 8'-0" x 8'-0" x 24" deep in two story areas and 6'-0" x 6'-0" x 18" deep in the single story areas. The perimeter foundation walls would be 14" to 16" thick, on 24" to 36" wide continuous reinforced concrete strip footings, extending a minimum of 4'-0" below finished grade.

The existing site to the rear of the building is sloping. The proposed scheme calls for the first floor to be below exterior grade. This difference in grade would require portions of the basement exterior walls to be cantilevered reinforced cast-in-place concrete foundation walls to resist soil pressures. Some walls would be 20 " thick, supported on 7'-0" wide x 2'-0" thick continuous reinforced concrete footings.

SLAB ON GRADE

Based on the existing school construction, the lowest level of the proposed building would be a four (4) inch thick concrete slab on grade reinforced with welded wire fabric over a vapor barrier on two (2) inch thick rigid insulation on eight (8) inches of compacted granular structural fill and a base course of eight (8) inches of compacted gravel.

NEW SUPERSTRUCTURE

The superstructures for the proposed additions would be comprised of two elevated floors and a roof. The addition to the existing Dining Room would be a single story structure.

FLOOR CONSTRUCTION

Typical Floor Construction

Typical floor construction would be a 5 1/4" light weight concrete slab on composite metal deck reinforced with welded wire fabric on wide flange steel beams spanning between steel girders and columns. The weight of the structural steel is estimated to be thirteen (13) pounds per square foot for the typical framing.

ROOF CONSTRUCTION

Typical Roof Construction

The roof construction would be galvanized, corrugated 1 1/2" deep, Type 'B' metal roof deck spanning between wide flanged steel beams and girders and columns. At locations of roof supporting mechanical equipment, a concrete slab would be provided similar to the typical supported floor slab. The weight of the structural steel is estimated to be twelve (12) pounds per square foot.

Low Roof Structure at the Dining Room Expansion

The roof would be the typical roof construction detailed above. The weight of the structural steel is estimated to be thirteen (13) pounds per square foot.

VERTICAL FRAMING ELEMENTS

Columns

Columns would be hollow structural steel columns. Typical columns would be HSS 8 x 8.

Typical Lateral Load-Resisting System

The proposed classroom wing additions would be separated by way of expansion joints from the existing building. The lateral load resisting system for the structures housing the classrooms would consist of concentric steel braced frames comprised of diagonal hollow structural steel sections between select columns.

The low roof structure at the Dining Room expansion would be positively attached to the existing concrete 2nd Floor with no expansion joint. The addition would be comprised of supplementary stabilizing steel moment frames.

++ END OF REPORT ++



ANDOVER HIGH SCHOOL

Andover, Massachusetts

Proposed Additions and Renovations Alternate #2 Scheme

March 7, 2014

PROPOSED SCOPE

The proposed scheme calls for interior renovations to the existing building. This scheme calls for architectural, mechanical, electrical and plumbing renovations. Minimal structural modifications would be required within the existing building. The kitchen area would require reconfiguration of existing partition walls and some concrete masonry walls. New skylights are proposed in the existing library roof, and new openings as required in the existing masonry walls for duct work and piping. Further investigation and study required to determine the full extent of the penetrations.

The proposed additions would be located at the front and back of the existing school. The first addition would be a single story expansion of the existing Dining Room. The second addition would be a single story addition to the existing classroom wing. The third addition would require the existing Choral and Band rooms on the front of the building to be demolished and replaced with a new multi-story addition.

PRIMARY STRUCTURAL CODE ISSUES RELATED TO THE RENOVATIONS TO THE EXISTING STRUCTURE

As required by the Massachusetts State Building Code, we have made a check for compliance with requirements of Chapter 34 "Existing Structures" of the MSBC which are amendments to the IBC 2009 and IEBC 2009.

We recommend the Prescriptive Compliance Method for this project. Based on the scope of the project, there are no additional structural requirements that would be triggered for compliance with the above referenced codes. Based on the scope of the renovations, no clipping of the existing masonry walls is required.

The proposed classroom wing addition would be separated an expansion joint from the existing structure. The Dining Room expansion would be attached to the existing structure. The third addition replacing the existing Choral and Band rooms would be separated by an expansion joint from the existing structure.

PROPOSED STRUCTURAL SCHEME

RENOVATIONS TO EXISTING

NEW SKYLIGHTS IN THE EXISTING LIBRARY ROOF

Further investigation and study is required to determine the full extents of work required for the proposed new openings in the existing library roof structure. We have determined by analysis that it is feasible to create openings in the concrete roof slab for new skylights. Depending on the extents of the proposed skylights, the existing diaphragm would have to be reinforced within the proposed openings by creating a structural steel horizontal truss. Allow for twelve (12) pounds per square foot of structural steel for this scope. Additional steel would be required to construct the curbs for the skylights.

KITCHEN RENOVATIONS

The kitchen area would require reconfiguration of existing partition walls and some concrete masonry walls.

AUDITORIUM COILING DOOR

A new coiling door is proposed in the existing auditorium. This partition would be supported by the existing roof structure and some new supplemental steel.

NEW SUBSTRUCTURE

TYPICAL FOUNDATIONS

Based on the foundations of the existing structure and the information obtained from the existing structural documents, the columns of the proposed structures would bear on reinforced cast in place concrete spread footings and the perimeter walls would bear on continuous reinforced cast in place concrete foundation walls. With the assumed bearing capacity of the soil of two (2) tons per square foot, a typical interior column footing would be 8'-0" x 8'-0" x 24" deep in two story areas and 6'-0" x 6'-0" x 18" deep in the single story areas. The perimeter foundation walls would be 14" to 16" thick, on 24" to 36" wide continuous reinforced concrete strip footings, extending a minimum of 4'-0" below finished grade.

The existing site to the rear of the building is sloping. The proposed scheme calls for part of the first floor to be below exterior grade. This difference in grade would require portions of the basement exterior walls to be cantilevered reinforced cast-in-place concrete foundation walls to resist soil pressures. Some walls would be 20 " thick, supported on 7'-0" wide x 2'-0" thick continuous reinforced concrete footings.

SLAB ON GRADE

Based on the existing school construction, the lowest level of the proposed building would be a four (4) inch thick concrete slab on grade reinforced with welded wire fabric over a vapor barrier on two (2) inch thick rigid insulation on eight (8) inches of compacted granular structural fill and a base course of eight (8) inches of compacted gravel.

NEW SUPERSTRUCTURE

The superstructures for the proposed classroom wing addition at the rear of the building would be comprised of a roof. The superstructure for the proposed classroom wing at the front of the building would be comprised of two elevated floors and a roof. The addition to the existing Dining Room would be a single story structure.

FLOOR CONSTRUCTION

Typical Floor Construction

Typical floor construction would be a 5 1/4" light weight concrete slab on composite metal deck reinforced with welded wire fabric on wide flange steel beams spanning between steel girders and columns. The weight of the structural steel is estimated to be thirteen (13) pounds per square foot for the typical framing.

ROOF CONSTRUCTION

Typical Roof Construction

The roof construction would be galvanized, corrugated 1 1/2" deep, Type 'B' metal roof deck spanning between wide flanged steel beams and girders and columns. At locations of roof supporting mechanical equipment, a concrete slab would be provided similar to the typical supported floor slab. The weight of the structural steel is estimated to be twelve (12) pounds per square foot.

Low Roof Structure at the Dining Room Expansion

The roof would be the typical roof construction detailed above. The weight of the structural steel is estimated to be thirteen (13) pounds per square foot.

VERTICAL FRAMING ELEMENTS

Columns

Columns would be hollow structural steel columns. Typical columns would be HSS 8 x 8.

Typical Lateral Load-Resisting System

The proposed classroom wing additions would be separated by way of expansion joints from the existing building. The lateral load resisting system for the structures housing the classrooms would consist of concentric steel braced frames comprised of diagonal hollow structural steel sections between select columns.

The low roof structure at the Dining Room expansion would be positively attached to the existing concrete 2nd Floor with no expansion joint. The addition would be comprised of supplementary stabilizing steel moment frames.

++ END OF REPORT ++

5.3

MEP Basis of Design

Mechanical, Electrical, Plumbing and
Fire Protection Systems
Basis of Design

For

Andover High School
Andover, MA

March 4, 2014



Prepared by:

Consulting Engineering Services, LLC

510 Chapman Street Suite 201, Canton, MA 02021

CES PN 2014008.00

INTRODUCTION

The purpose of this study is to provide enough information to provide a reasonable cost estimate for mechanical, electrical, plumbing and fire protection systems. The work is divided into three building areas, the media center, the cafeteria, and the proposed addition.

All references to proposed plans and Alternates are based on sketches provided by the Drummey Rosane Anderson, Inc.

Information about existing systems was based on site visits as well available drawings provided to us. These drawings are dated 1994, and for the sake of this study are assumed to be reasonably accurate.

MECHANICAL SYSTEMS

APPLICABLE CODES & STANDARDS

- 780 CMR: Massachusetts State Building Code, 8th Edition
 - (2009 International Building Code)
 - (2009 International Existing Building Code)
- 527 CMR: Massachusetts Fire Prevention Regulations
- 248 CMR: Massachusetts Plumbing Code
- 2009 International Mechanical Code (IMC)
- 2009 International Energy Conservation Code

FIRE PROTECTION

The entire building will be provided with a fire sprinkler system, in accordance with the state code. In the 1994 expansion, approximately 60 % of the facility was provided with a fire sprinkler system. At the fire service entrance, located in the lower mechanical room, two flanged connections were provided in the 8" service main to accommodate future expansion. These connections were to be fit up with alarm check valves, zone control valves, and floor control valves as required.

The scope of this project will be to complete the fire sprinkler system in the existing building, and provide fire sprinklers in the new additions. Utilize the capped flanges for the fire sprinklers, and provide the necessary alarm check valves, zone control valves and floor control valves, piping and sprinkler heads to provide a system in accordance with the Massachusetts Fire Prevention Regulations.

PLUMBING SYSTEMS

Media Center

No additions to the plumbing system are anticipated in the media center.

Cafeteria Expansion

The expansion in this area is for increased floor area only, no plumbing fixtures or piping will be required. The existing kitchen and new service line will be provided with new kitchen equipment. The plumbing systems in this area, including grease waste, sanitary waste and vent, domestic hot and cold water and gas will be reconfigured as necessary to accommodate the new equipment, and reconnected to existing mains. Major trenching will be required for new floor sinks and drains.

Classroom Addition

In Alternate 2, two (2) toilet rooms are shown on the fourth level of the east addition. No additional toilets are shown in the Alternate 1 scheme. The sanitary waste, vent and domestic hot and cold water for these toilets will connect to the existing mains located at the toilet group immediately to the north of the existing library, approximately 100 feet away from the proposed toilets in this scheme.

In all of the alternate plans, new plumbing will be required to serve the science labs. It is anticipated that each lab would be provided with an emergency shower/eye wash, sinks, and gas to the lab counters. The sanitary waste and domestic water required for these fixtures would be connected to the mains located to the immediate north of the media center. The plumbing vent lines will terminate through the roof of the addition. The gas for the lab counters, where required, will connect to the existing gas piping system serving the current science labs.

In addition to the services listed above, a tempering valve will be installed to provide tempered water to the emergency showers/eyewash located in the labs. In addition a central buried acid neutralization system tank will be installed in a storage room floor for the acid waste to filter through, by Orion or equal.

HVAC

Media Center

The existing media center is currently air conditioned by a split system d/x unit (AHU-3 & ACCU-1), with the air handling unit located in the mechanical room on the first level, and the condensing unit located on the roof of the building. This unit is sized for approximately 9,000 CFM supply air, and 30 tons of cooling. The ductwork is exposed. The amount of air conditioning in this space is sufficient to accommodate the renovation, even with the addition of the skylights and/or monitor windows. No changes to the existing HVAC system, other than rework of ductwork to avoid skylights are required.

Cafeteria

The cafeteria is currently provided with heating and ventilation from fourteen (14) unit ventilators located along the exposed east side of the building. These ventilators provide approximately a total of 8,100 cfm of outside air to the space. Under this project the east wall of the room will be extended out approximately fifteen (15) feet, adding approximately 2,500 additional square feet to the room to accommodate an anticipated seating capacity of 700 students. The increased occupant capacity will increase the ventilation requirement by approximately 2,000 cfm.

Due to the age of the existing unit ventilators (twenty years), it is recommended that they be replaced with units of similar capacity. The capacities of the existing units are as follows:

Five (5) rated at 1,500 CFM total air, 685 CFM outside air and 6.0 GPM of heating hot water.

Nine (9) rated at 1,250 CFM total air, 540 CFM outside air and 5.1 GPM of heating hot water.

To accommodate the increased ventilation requirements, three (3) new unit ventilators by Trane or equal will be added, two (2) on the north wall, and one (1) on the south wall of the expansion. These units would be similar to the units designated UV-4, which have a capacity of 1,500 total cfm each, with 650 cfm of outside air, and a heating capacity of approximately 60 MBH (requiring a total of 18 GPM of additional heating hot water).

The existing hot water supply and return run-outs to the existing unit ventilators will need to be extended approximately fifteen (15) feet horizontally to serve the new units. At present there are two (2) 2" run-outs, one (1) 1/4" run-out and one (1) 1" run-out that will need to be extended. These run-

outs will be routed approximately twenty (20) feet down from the mains, and interconnecting piping between the ventilators will be provided.

The three additional new unit ventilators will require three (3) new 1" run-outs connected to the 4" mains. Approximately thirty-five (35) feet of piping will be required for each of the additional unit ventilators.

All eighteen (18) new ventilators will require isolation valves on the supply and return, an electric control valve (wired to the existing DDC system), and a balancing valve.

The minimal increase of heating hot water required will not adversely affect the sizing of the piping mains in this area.

The new kitchen will require new exhaust fans for the pizza oven hood, the main cooking line (two fans required), and the dishwasher. It is recommended that all connecting ductwork be replaced, and rerouted in the existing shafts.

The estimated sizes for the new fans are as follows:

Pizza oven – 600 cfm @ 1.0" SP

Dishwasher - 800 cfm @ 1.0" S.P.

Main cooking line – (1) 6000 cfm @ 2.0" S.P and (1) 4000 cfm @ 2.0" S.P.

A new make-up air unit, sized for 9500 cfm @ 1.5" S.P. shall be provided. Existing ductwork will need to be modified or replaced. Make-up air unit should consist of a supply fan filters, and a gas-fired furnace, and shall be electrically interlocked with the exhaust fans.

Classroom Addition

A typical existing classroom in the school is provided with a single unit ventilator, and baseboard radiation. The combination of radiation and unit ventilator extends along the full length of the exterior wall. All interior spaces are conditioned with air ducted from heating and ventilation units. The vast majority of the classrooms are not provided with air conditioning.

There are two options available for the classroom addition; this narrative is requesting pricing for both.

Option 1: Continue with the concepts employed in the existing building. Provide all exterior classrooms in the new addition with a single classroom ventilator, and baseboard radiation. Depending on which classroom alternate is accepted, this would require the addition of 25-30 new unit ventilators by Trane or equal, and 250-300 feet of fin tube radiation by Rittling or equal. The interior spaces and corridors (approximately 10,000 total square feet, dependent on the alternate selected) would be heated and ventilated with roof mounted H & V units by Trane or equal, one for each wing. The larger unit, located on the roof of the east addition would be sized at approximately 7,500 cfm, and the unit for the west addition (less interior space) for approximately 2,000 cfm. The units will be supplied with natural gas furnaces, or with heating hot water coils. (Freeze protection, in the form of local circulation pumps, or hot water protected by glycol, would be required for exterior hot water coils).

Option 2: This would use baseboard radiation (400 feet) for heating, but would replace the new unit ventilators with roof mounted dedicated outside air units. These units would provide the required ventilation to the classrooms via ductwork concealed above the ceilings, and would include a supply air fan, an exhaust air fan, filters, a hot water heating coil, and a heat recovery section. Each unit would be approximately 12,000 cfm, located on the roof of the east and west additions, by Xetex or approved equal. (Freeze protection, in the form of local circulation pumps, or hot water protected by glycol, would be required for exterior hot water coils).

Option 2 will require significantly more sheet metal ductwork, but the energy savings with the heat recovery would be significant. The actual payback for this system is outside the scope of this project, but previous studies have shown the payback for energy recovery to be four to five years.

In both options, science labs will be provided with the appropriate exhaust systems for any fume hoods. There will be two (2) or three (3) science labs depending on the alternate chosen. Each exhaust fan will be sized for 750-1,000 cfm by Greenheck or equal, provided with explosion proof motors, and code mandated discharge vertical ductwork.

The hot water required for this expansion is to be 140 gpm (1,400 MBH). Due to the size of the expansion, new 4" HWS & R mains will be routed from the existing boiler room to the various heating terminals discussed in the previous paragraphs. The estimated length of the mains is between 400 and 500 feet each.

MATERIALS & METHODS

1. All requirements of applicable local, state and national codes will apply to the work of this project.
2. Sanitary waste piping shall be cast iron with mechanical fittings. Vent piping will be galvanized steel or cast iron. Acid waste piping shall be of an acid resistant material, glass or polypropylene.
3. Domestic water piping shall be Type L copper tubing with soldered fittings.
4. Fire protection piping shall meet the requirements of NFPA 13, and local fire code requirements.
5. Heating hot water piping 2 ½" and larger will be Schedule 40 black steel with welded and flanged fittings. Heating hot water 2" and smaller shall be Type L copper tubing with soldered fittings, or Schedule 40 black steel with threaded fittings.
6. Provide dielectric fittings between ferrous and copper piping.
7. All plumbing and HVAC piping shall be insulated in accordance with the 2009 International Energy Code.
8. All ductwork shall be galvanized steel, pressure classification of below 2", with gauges and installation requirements as outlined by SMACNA standards, with the exception of the fume hood exhaust ductwork, which shall be stainless steel. Kitchen exhaust ductwork from the Class 1 hoods on the main cooking line shall be welded 16 gauge steel, or stainless steel, and shall be protected with a two hour shaft, or equivalent duct wrap.

ELECTRICAL SYSTEMS

APPLICABLE CODES AND STANDARDS

The electrical systems will be designed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements.

- Massachusetts Electrical Code, 527 CMR, current edition including NFPA 70, 2014 edition as amended by 527 CMR.

- Massachusetts Building Code, 780 CMR, current addition including the 2009 International Building Code as amended by 780 CMR.
- Massachusetts Comprehensive Fire Safety Code, 527 CMR, current addition.
- The 2009 International Energy Conservation Code, including all state adopted amendments.
- Illuminating Engineering Society Lighting Handbook (IESNA), 9th Edition.
- NFPA, Latest Versions.
- ASHRAE 90.1.

Existing Main Electrical Service and Distribution

1. The building is served by a 3,000 ampere, 480Y/277 volt, 3-phase, 4-wire electrical service, with a 2,500A main located in the Main Electrical Room 1068 on the first floor. The service primary feed originates from a utility pole to an exterior pad mounted utility company transformer. The main service equipment consist of a 2,500A main disconnect switch with ground fault protection and distribution sections. Metering is per utility company requirements. The service equipment is approximately 18 years old and is in good condition and shall be reused.
2. The 2,500A main service feeds distribution panelboards throughout the facility at 480Y/277 volts. Branch circuit panelboards fed from distribution panelboards and operating at 480Y/277 volts serve lighting and mechanical loads throughout the facility. Receptacles and other 208Y/120 volt loads are fed from 208Y/120 volt branch circuit panelboards fed from step-down transformers. Transformers and 208Y/120V panelboards are typically located adjacent to 480Y/277 volt branch paenlboards in electrical closets throughout the facility. The Collins Center 1,200A, 480Y/277 volt panelboard is fed from the 2,500A main service.

Existing Emergency Generation System

1. Emergency power for the facility is supplied by and existing 250 KW diesel fired standby/emergency generator with 480Y/277 volt output. The generator is located in Emergency Electric Room 1045. The 400A automatic transfer switch serving the emergency distribution system is also located in this room. The emergency distribution system consists of a main emergency distribution panelboard which serves emergency branch circuit panelboards located throughout the facility. The system serves life safety systems (emergency lighting), mechanical equipment, kitchen equipment and two existing elevators.

Existing Fire Alarm Systems

1. Currently two addressable fire alarm systems, as manufactured by EST, serve the facility. One system serves the main school and support spaces, the second system serves the Collins Center auditorium and support spaces. The two systems are interconnected for signaling and evacuation signal coordination. The main school system shall be used for this expansion.

Existing Telecommunications, Paging, Master Clock and Security Services and Distribution

1. The telecommunications infrastructure for the facility consists of voice and data services from the utilities on the street to the main distribution frame (MDF). Telecommunications throughout the

facility is distributed from the MDF to intermediate distribution frames (IDF). Horizontal backbone fiber optic and voice cables extend from the MDF to each IDF. The IDF's serve the station drops at voice and data outlets throughout the facility via copper station cables.

2. The existing paging and master clock system is used for general paging, intercom functions and master clock functions. Combination speaker/clock assemblies are distributed throughout the classrooms.
3. The existing security system includes motion detection and door alarms on perimeter and select interior doors, connected back to head end control panels.

New Electrical Distribution

The new classroom and cafeteria additions (Alternate 1 & 2) will be served using new and existing branch circuit panelboards. Renovations to the Media Center will be served from existing branch circuit panelboards. Renovations to the Kitchen and Servery will be served from existing branch circuit panelboards and replacement kitchen panelboards upgraded to include capacity for new kitchen equipment. Electrical closets in the "E" Wing corridor on the third and fourth levels contain lighting, receptacle and emergency lighting branch circuit panelboards. Electrical closets on the first, third and fourth levels of the "C" building contain lighting and receptacle branch circuit panelboards. The closets referenced are adjacent to the planned additions and will be utilized to serve the additions. The existing distribution panel in the Collins Auditorium will not be used to serve the new additions. Existing lighting and receptacle branch circuit panelboards adjacent to the renovated Media Center will be used and replaced as required to serve these spaces.

Existing panels 'P4K', 'PKA', and the associated transformer currently serving the Kitchen and adjacent spaces will be replaced and upgraded to serve the renovated kitchen loads. New feeders and the circuit breaker feeding panel 'P4K' at the main service switchboard will be replaced. Based on preliminary kitchen equipment requirements, it is anticipated that existing panelboard 'P4K' will be replaced with a 225A, 480Y/277 volt panelboard. The transformer feeding existing panelboard 'PKA' will be replaced with a new 112.5 KVA transformer and existing panelboard 'PKA' will be replaced with a 300A, 208Y/277 volt panelboard. Circuit breakers with shunt-trip accessories will be provided for branch circuits feeding kitchen equipment served by the new exhaust hoods and tied in to the emergency shutdown buttons in the renovated Kitchen. Existing Kitchen emergency panel 'PKE' will remain. Other existing lighting and receptacle branch circuit panel boards adjacent to the renovated Servery will be used to serve the Servery and ancillary spaces.

Existing panelboards in good condition and feeders to be re-used where possible. Replacement panelboards shall be provided with new feeders, using existing conduits and raceways if necessary.

New branch circuit panelboards will be provided in an electrical closet in the new addition to supplement available existing power and serve the new elevator, science lab and mechanical loads. The following new branch circuit panelboards are anticipated.

- (1) 400A, 480Y/277 volt panelboard fed from and existing 400A spare circuit breaker at the main electrical switchboard with 4#500 KCMIL, 1#3G, in 4 inch conduit. Panelboard to serve new elevator, new mechanical loads, new lighting and new receptacle branch circuit panelboards.
- (1) 100A, 480Y/277 volt panelboard adjacent to and fed from the new 400A panelboard to serve new lighting loads.

- (1) 200A, 208Y/120 volt panelboard with integral TVSS protection fed from a new 75 KVA, three phase, 480 delta primary - 208Y/120 volt secondary transformer located adjacent to the new 400A panelboard. Panelboard to serve new Science Classroom shunt-trip panels and new receptacle loads.
 - (2) 100 amp, 208Y/120 volt 18 circuit panelboards with 30A-3P main circuit breaker with shunt-trip accessory mounted in science classrooms to provide emergency power-off function for science classrooms with gas service. Quantity to be verified
1. Branch circuits shall be new and installed in EMT conduit. Type MC cable shall be limited to concealed spaces above finished ceilings in classrooms or drywall type partitions. EMT conduit shall be used to the first device in a branch circuit and shall be used in all masonry or CMU partitions.
- (12) duplex receptacles per classroom, (3) circuits per classroom.
 - (3) duplex receptacles per office or small collaborative space, (1) circuit per space.
 - (16) floor boxes with power, (8) circuits and data in the renovated Media Center instruction spaces.
 - (2) floor boxes with power (1) circuit and data for cashiers locations in the renovated Servery.
 - Circuits for new kitchen equipment as required.
 - (2) duplex receptacles at the renovated Media Center circulation desk, (1) circuit.
 - Circuits for all HVAC equipment as required.
 - Circuits for new elevator including code compliant disconnects and elevator recall control circuitry.
 - Circuits for electric water coolers throughout the renovated space.
 - Circuits for all plumbing equipment in the renovated space.
 - Circuits for the fire alarm equipment, paging & master clock equipment, telecommunications equipment and security equipment as required.
 - Circuits for office equipment as required.
 - Science classroom emergency shutdown buttons located at the doors and instructor's station in science classrooms with gas service.

Low Voltage Systems

The existing telecommunications infrastructure will be used to support new telecommunications requirements in the new addition and renovated spaces.

1. Ceiling mounted projectors connected to the teacher's station shall be provided in each academic space (Projectors supplied as part of the FF&E package, all wiring & interconnecting conduit provided under this contract).

2. The new and renovated spaces will be provided with the following telecommunications outlets. All wiring shall be Cat 6e cable, installed in concealed 1" conduit minimum, from the ceilings down to the outlet location.
 - Minimum of (6) data outlets in each classroom.
 - (1) wall phone outlet in each classroom mounted @ 48" AFF.
 - A minimum of (1) Teachers Outlet in all academic spaces. This shall include (2) data outlets, (1) voice outlet, and wiring from the outlet location to the overhead projector.
 - A minimum of (1) Voice/data outlet in each office.
 - Data outlets in studios, Chorus, Band and laboratory spaces as required.
 - Voice/data outlets in the renovated Media Center and Server room as required.
 - Cat 6e cable shall be provided to each telecommunications outlet from the associated IDF closet.
 - Quantities shall be verified during design development phase.
3. Work shall include termination and testing of all cables, modular faceplates and jacks, 48 port patch panels, free standing or wall mount equipment cabinets for IDF expansion as necessary, patch cables and labeling. Network switches to be provided by the Owner. Coordinate all work with Owner's telecommunications manager and comply with all owner installation standards, testing and labeling procedures.

The existing facility paging, intercom and master clock systems will be used to support the new addition and renovated spaces.

1. The new addition and renovated spaces will be provided with a Public Address system throughout the space with the following features:
 - Upgrades to main system head end equipment to add intercom stations inputs, amplifiers and speaker zones, including software and firmware upgrades to latest revision.
 - Coordinate expansion of paging zones with the owner.
 - Combination speaker/clock assemblies to match existing in each classroom.
 - Intercom call buttons in each classroom.
 - Ceiling mounted speakers in corridors with 30 foot spacing.
 - Speakers in specialty areas placed sufficient for public announcements. Quantities and locations to be determined.
 - Secondary clocks in renovated Media Center, studios, Chorus, and Band rooms.
 - Fire alarm interface to mute PA system in the event of an emergency.

The existing facility security and door alarm systems will be used to support the new addition and renovated spaces.

1. The new and renovated spaces will be provided with the following security system protection:
 - CCTV cameras at exterior entrances and other areas monitoring the perimeter of the building and sensitive interior areas.
 - Card Key access at select building entrances and sensitive interior doors.
 - Motion detectors in corridors, computer classrooms, media center and other areas as directed by the Owner.
 - Door contacts on each exterior door, and other doors as directed by the Owner.
 - Control panels and power supplies in the new addition to support the system expansion.
 - Quantities shall be verified during design development phase.
2. Upgrades to main system head end equipment to include software and firmware upgrades to latest revision to support new capacity of security points.

The existing main school facility fire alarm systems will be used to support the new addition and renovated spaces.

1. Provide devices 100% compatible with the existing system. Expansion to include the following:
 - Transponders and power supplies as required to support the system expansion.
 - (1) speaker/ strobe in all classrooms. Multi-candela strobes units to be provided, strobe candela intensity to be selected based on classroom dimensions.
 - Minimum of (1) speaker/strobe with additional strobes in all spaces occupied by students that are 901 to 1600 square feet. Multi-candela strobes units to be provided, strobe candela intensity and quantity to be selected based on classroom dimensions.
 - Minimum of (1) strobe unit in all occupied spaces. Multi-candela strobes units to be provided, strobe candela intensity and quantity to be selected based on space dimensions.
 - Speaker/strobes within the all corridors, 100 feet on center.
 - Speaker/strobe units with voice evacuation equipment shall be provided in all designated places of assembly such as the Servery. Multi-candela strobes units to be provided, strobe candela intensity and quantity to be selected based on space dimensions.
 - Minimum of (4) speaker/strobes in the renovated Media Center. Multi-candela strobes units to be provided, strobe candela intensity and quantity to be selected based on space dimensions.
 - Smoke detection in corridors and spaces to match existing building protection.
 - Monitoring modules for sprinkler tampers and flows.
 - Minimum of (2) duct smoke detectors for each air-handling unit, (1) in the supply, and (1) in the return duct. Multiple detectors in each supply and return duct system to be located based duct branch layout.

- Control modules for fan shut-down and damper control.
 - Monitoring and control modules to interface with the new ANSUL systems protecting the new kitchen exhaust hoods, including interface with the emergency shutdown system for the renovated Kitchen.
 - Magnetic door hold-open devices at all required corridor doors, connected to the control modules to release on alarm condition.
 - Smoke detector within five feet of both sides of the corridor doors with magnetic hold-opens, where required by building fire separation.
 - Multi-criteria combination smoke/heat and CO detectors in spaces containing fossil fuel burning heating equipment. CO detection to provide a separate supervisory signal from smoke/heat detection.
 - All fire alarm system wiring shall be plenum rated fire alarm MC cable where concealed and EMT conduit with type THHN wire where exposed.
2. Upgrades to main fire alarm control panel equipment to include expansion modules, power supplies, cabinets, software and firmware upgrades to latest revision to support new capacity of security points.

Lighting Systems

1. The following fixtures will be provided:
- Linear pendant, direct/indirect fluorescent fixtures in each classroom with integral dimming ballast to support the classroom daylighting controls.
 - 2x4, 2 x 2 or 1 x 4 fluorescent recessed fixtures, 10 feet on center throughout the corridors.
 - 2x4 or 2x2 direct/indirect fluorescent recessed fixtures for office areas.
 - 2x4 or 2x2 wet location fluorescent recessed fixtures with acrylic lenses for the Kitchen.
 - Pendant mounted specialty fixtures in the high bay Media Center.
 - Linear pendant, direct/indirect fluorescent fixtures in Band and Chorus rooms.
 - LED exit signs at all exterior doors, on each side of corridor doors and along paths of egress as required.
 - Floor proximity exit signs at exit doors in all electrical closets.
 - Occupancy sensor switches in all offices, bathrooms and storage rooms for all light fixtures.
 - Daylight zone control with integral dimmable ballasts to control daylighting zones adjacent to large exterior windows in large non-classroom spaces.
 - Full daylighting controls, including occupancy sensors, daylight sensors, dimmable ballast, control panels, etc. shall be provided in all classrooms. Classroom controls to incorporate

instruction and A/V mode lighting levels in addition to occupancy sensor and daylighting controls.

- 4-foot industrial fixtures in all electric rooms, mechanical spaces and areas without suspended ceilings.
- All fluorescent fixtures shall be provided with T8 or T-5 lamps and high power factor electronic ballasts.
- Accent and feature lighting shall be provided as selected by the Architect, in areas such as corridors, main lobby etc.

Materials and Methods

1. Include the following basic materials and methods of construction:

- Wiring shall be THHN/THWN copper, installed in EMT conduit for most circuits.
- Type MC cable shall be used as prescribed in sections above.
- Devices shall be specification grade, NEMA 5-20R etc.
- Disconnect switches shall be fusible heavy-duty type. NEMA 1 or 3R as required for locations installed.
- Pedestal devices within Server area shall be stainless steel.
- Circuit breakers shall be fixed element, thermal magnetic type.
- Panelboards shall be copper bus, with hinged door-in-door trim.
- Branch circuit breakers shall be bolt-on.
- All conduits, circuits and devices shall be labeled.
- Conduits below slabs shall be schedule 40 PVC, with rigid steel conduit sweeps.

2. Include the following miscellaneous items:

- Emergency call light/bell mounted above the doors and associated call switches shall be provided at the accessible toilet rooms, with associated call switches.
- LED fixtures mounted on the perimeter of the exterior of the building, at egress doors.

Energy Conservation

1. All new equipment specified, shall be designed per the 2009 International Energy Conservation Code.
2. Through the use of the building management system (BMS), occupied/unoccupied cycles shall be established to avoid unnecessary energy consumption.

5.4

Kitchen Report

Kitchen

Description/Assessment:

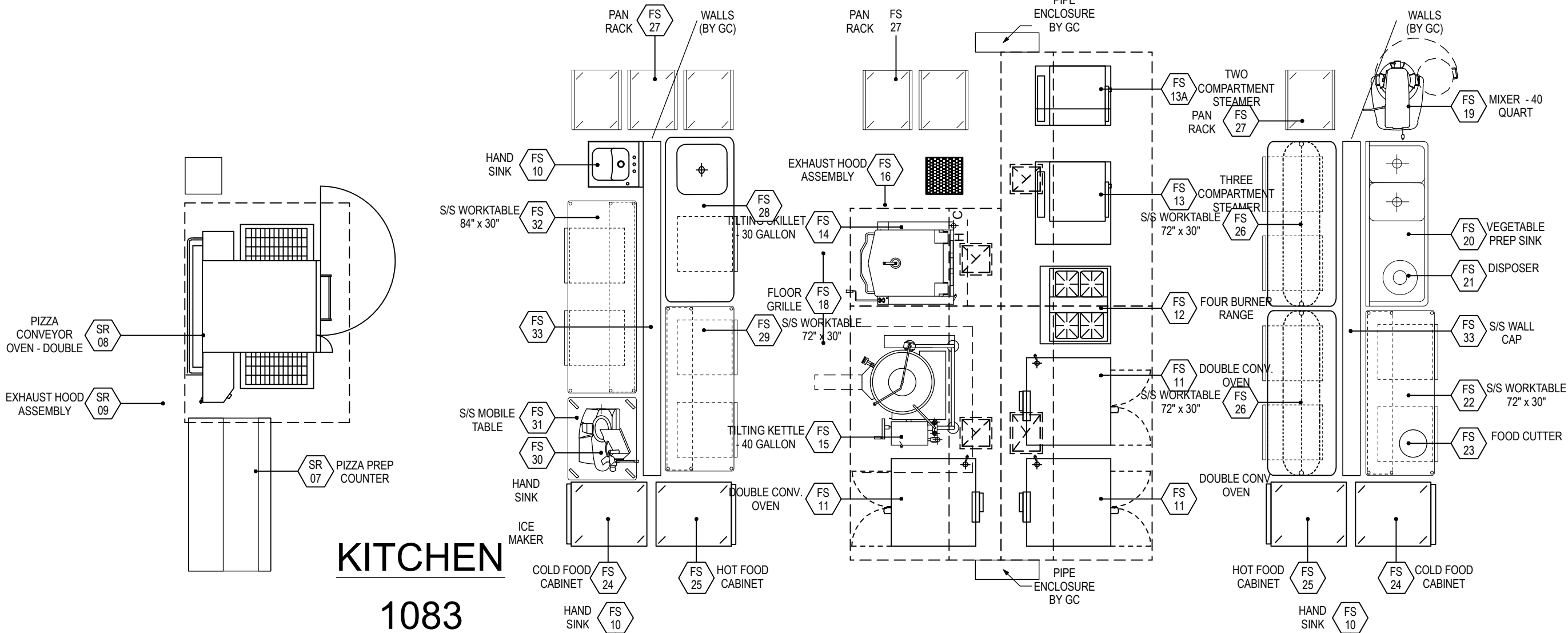
- The kitchen space is large but wasted space because of the shape. The serving line is in a good position in relationship to the main cooking battery.
- The Serving line is a straight line configuration with a deli area, a grab and go space, flat top counter space and two hot well areas. The Hot well areas each have 8 hot wells. There are three cashier locations in the existing layout which are built into the serving line.
- The main cooking battery under the main exhaust hood includes, one Doyon Oven, two double convection ovens, griddle w/six burner range, one warming cabinet and a tilting skillet. The age of the equipment is old with different voltages.
- There are several prep spaces in the kitchen adjacent to the cooking area. These include an ice machine, two compartment refrigerator, worktables, worktable with rack and a microwave oven. The stainless steel tables are scratched, old but in generally okay shape.
- A second prep space is located near the Deli serving line. This area includes two worktables, one worktable with sink, a two compartment reach-in refrigerator and one two compartment reach-in freezer. Adjacent to the Freezer is a single oven. There is no hood above this oven.
- There is very little lighting above the servery.

REFRIG.

1075

STORAGE

1078



KITCHEN

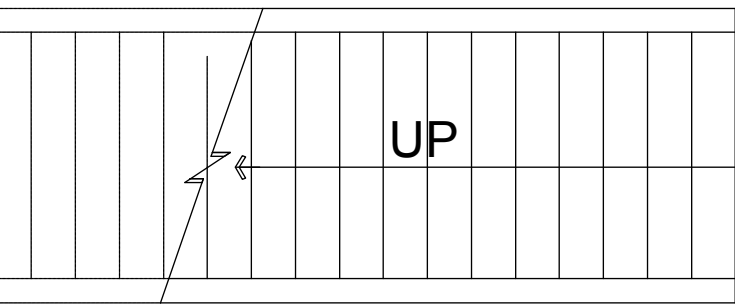
1083

STOR.

1080

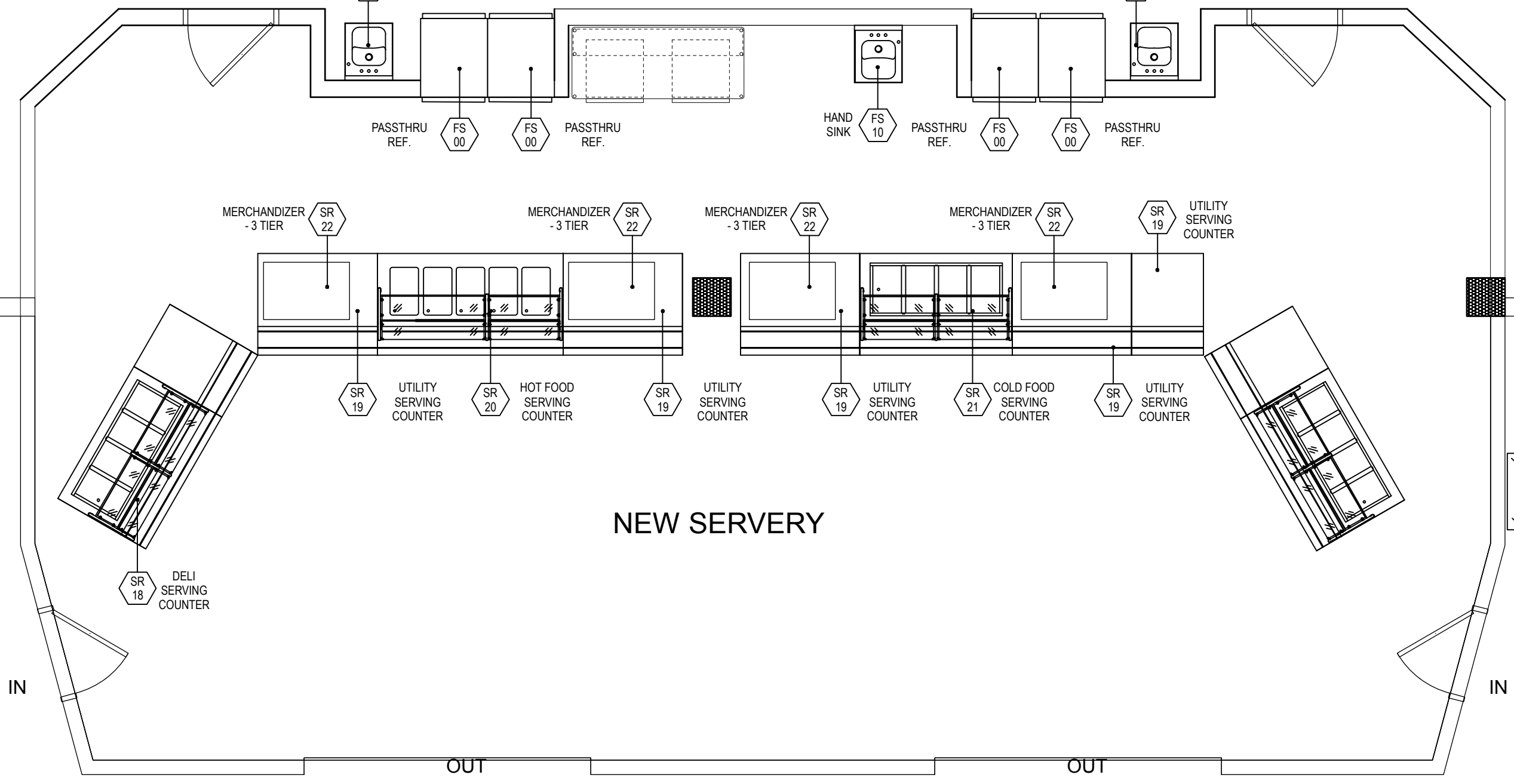
CORRIDOR

1090



CAFETERIA

1088



NEW SERVERY

MILK CABINET

SR 24

MILK CABINET

SR 24

DOUBLE CASHIER'S STATION

SR 25

DOUBLE CASHIER'S STATION

SR 25

5.5

Asbestos Materials



CDW CONSULTANTS, INC.

CIVIL & ENVIRONMENTAL ENGINEERS

April 9, 2014

Mr. Vladimir Lyubetsky
Drummey Rosane Anderson, Inc.
235 Bear Hill Road
Fourth Floor
Waltham, MA 02451

RE: Preliminary Estimate of Asbestos Materials Based on Visual Survey Only -
Andover High School, Andover MA

Dear Mr. Vladimir Lyubetsky:

CDW Consultants, Inc. (CDW) has prepared this letter report as detailed in our proposal to your office dated April 3, 2014. The intent of the work proposed was to identify and approximately quantify suspect asbestos-containing building materials (ACM) within the Cafeteria/Kitchen, Library and potential additions/renovation of the Band and Music Room areas that will be the subject of future renovations. No testing was proposed or conducted. The work consisted of a partial document review and a visual assessment and approximation of suspect ACM that could affect renovation costs in the designated areas described above.

FINDINGS

Prior to conducting the visual assessment, CDW reviewed documents made available to us by your office. It is our understanding that the documents originated from the Andover School System Administration and Facilities Office. No documents were available at the High School for review. The documents reviewed are summarized in Table 1 attached to this report. The documents provided lacked detail on the areas of concern and did not include the findings of an original inspection of these areas. As a result, the findings presented herein are primarily based on the observations of the visual site inspection completed on April 4, 2014, as described below.

On Friday, April 4, 2014, CDW personnel (Paul Matuszko and Chris Hack) experienced in assessing asbestos-containing building materials arrived at the school and performed a visual assessment of the cafeteria/kitchen and band and music rooms for suspect asbestos containing building materials. They were accompanied by an assistant principal and the facilities maintenance supervisor.



A list of suspect asbestos-containing building materials and approximated quantities are summarized on Table 2, attached to this report.

Although several different types of suspect asbestos-containing building materials were observed, most of these materials appeared to be in good condition and of recent installation (i.e. installed within the last 15 years). Generally products installed in schools after 1990 do not contain asbestos however, bulk testing is required in order to confirm this unless the building materials have been installed under the direction of an Architect that has certified them as non-asbestos-containing materials. Since this documentation has not been provided to us, the presumption must be that the materials are suspect ACM.

In a few areas, mudded fittings were observed in the kitchen area that were spray-painted red. These fittings are consistent with other fitting materials previously sampled and determined to be ACM. We suspect that these fittings are ACM and will need to be abated if they are to be disturbed by renovation activities.

CONCLUSIONS AND RECOMMENDATIONS

Based on the findings presented above, suspect asbestos containing building materials were observed. These materials will need to be sampled and analyzed for asbestos in accordance with federal regulations prior to any renovations that may disturb this material.

We estimate that a bulk sampling analysis program could be completed for approximately \$3,000 to \$5,000 depending upon further delineation of the scope of work and the presence of suspect building materials that could not be observed during our inspection (e.g. conditions above suspended ceilings subfloor substrates, roofing and façade materials).

As indicated above, much of the visually identified suspect asbestos containing material appeared to be in good condition and of recent installation. We do not anticipate that all of the suspect asbestos building materials identified during the visual inspection will test positive or be subject to renovation. As such, and for feasibility evaluations purposes we feel that assuming as much as 25% of the materials may require abatement is a reasonable estimate at this time.

It is important to note that window caulking in the areas described as being potentially part of the scope of planned renovations may contain PCBs. We recommend including PCB analysis into the scope of any bulk sampling program to be conducted associated with continued feasibility analyses as well as a hazardous building materials survey that would be inclusive of fluorescent lighting, ballasts, emergency lighting, etc.



Mr. Vladimir Lyubetsky
April 9, 2014
Page 3

QUALIFICATIONS AND LIMITATIONS

This report was prepared in accordance with generally accepted engineering practices with the scope of work described herein. Information provided by third parties was not independently verified for accuracy or completeness. A detailed description of proposed renovation work or architectural drawings was not provided at the time of the visual inspection. Historical documents provided to us regarding asbestos inspections and abatement work was not of sufficient scope or detail to identify asbestos containing building materials within the areas which may be affected by the proposed renovations. The assessment was limited to openly visible surface areas. No sampling was performed. No warranty with regards to the presence or absence of asbestos-containing building materials or the quantity thereof is expressed or implied. Additional assessment is needed in order to evaluate the presence of asbestos containing building materials prior to any renovation work affecting these areas.

Thank you for this opportunity to provide these services to you. We look forward to working with you again in the future.

Sincerely,
CDW CONSULTANTS, INC.

Michael Flynn, CHMM
Senior Environmental Scientist

William J. Betters, P.G., LSP
Director of Environmental Services

Enclosures:

TABLES:

Table 1: Summary of Documents Reviewed

Table 2: Summary of Suspect Asbestos Containing Building Materials Observed

FIGURES

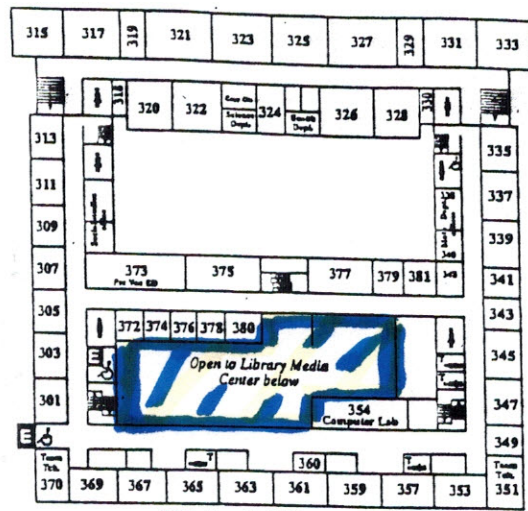
Figure 1: Floor Plan Outline of Areas Visually Inspected

Map of Andover High School

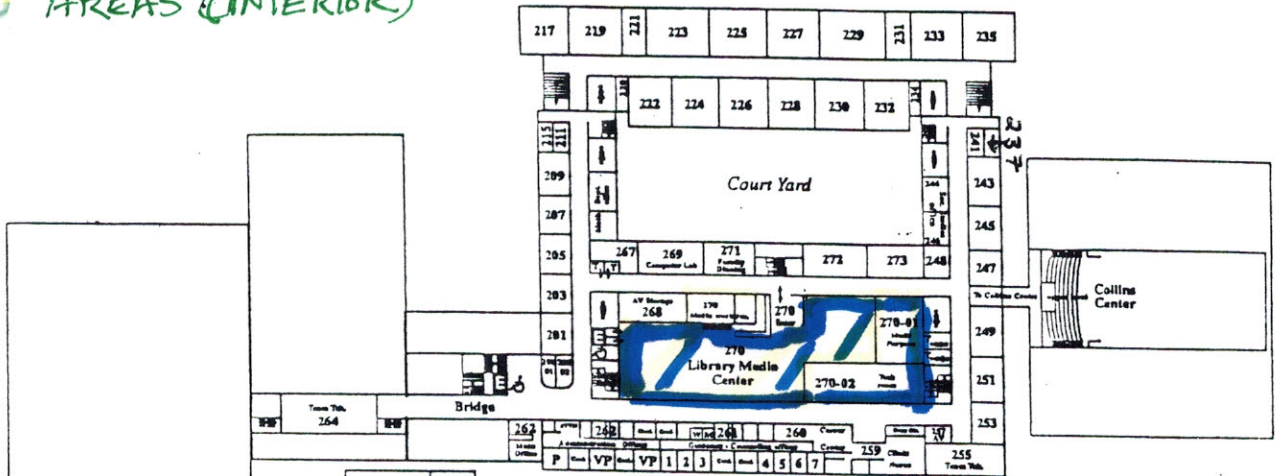
FIGURE 1
VISUAL SURVEY BOUNDARIES
PRELIMINARY ASSESSMENT



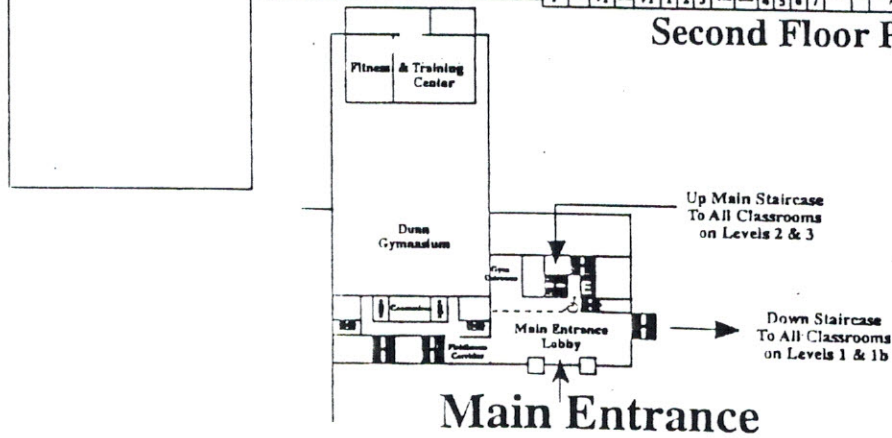
**SURVEYED
AREAS (INTERIOR)**



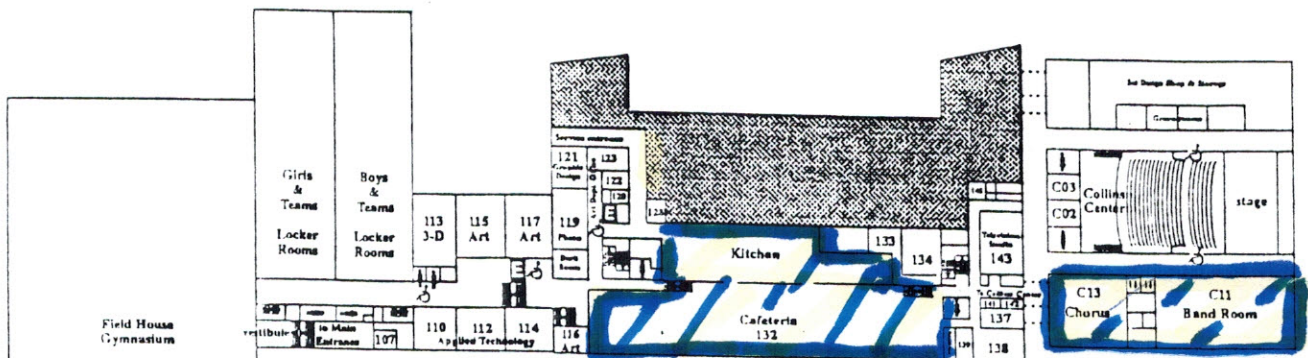
Third Floor Plan



Second Floor Plan



Main Entrance



Lower Floor Plan - Level 1

TABLE 2
VISUALLY OBSERVED
SUSPECT ASBESTOS CONTAINING BUILDING MATERIALS

Location	Materials Observed	Estimated QTY	units	Unit Price (Approx)	Extended Price (Estimate)
LIBRARY	Carpet	5500	SF	4	22000
	Yellow Carpet Mastic on concrete floor	55	SF	4	220
	Sheetrock	5500	SF	7	38500
	Joint compound	1100	SF	7	7700
	Window System Glazing	1000	LF	10	10000
	Red Fire stopping on Electrical line	5	LF	10	50
Room 270-02	New 1'x1' blue FT	200	SF	4	800
	FT Mastic	200	SF	4	800
	2'x4' CT	200	SF	7	1400
	New Greenish spray applied fire proofing	200	SF	7	1400
	Sheetrock	200	SF	7	1400
	Joint Compound	100	SF	7	700
Room 271-01	Carpet	200	SF	4	800
	Carpet mastic	200	SF	4	800
Office Media room	carpet	200	SF	4	800
	2'x4' FT	200	SF	4	800
	FT Mastic	200	SF	4	800
					0
Stairs	Brown Tread mastic	200	SF	4	800
	Window Glazing	750	LF	10	7500
	Fluorescent lights throughout	300	each	2	600
CAFETERIA	New 2'x2' CT	4000	SF	7	28000
	New 1'x1' FT	4000	SF	4	16000
	FT Mastic	4000	SF	4	16000
	Expansion JC @vending Machine 8	12	LF	10	120
	Sheetrock Wall	1700	SF	7	11900
	Ceiling Board	4000	SF	7	28000
	Joint Compound	500	SF	7	3500
	New Synthetic Window Glazing	500	LF	10	5000

	Caulking Strip at heaters below windows	20	LF	10	200
	No Access Above 18" Ceilings				0
	Vinyl Cove Base mastic	200	LF	10	2000
	Exterior new Caulkings	4000	SF	10	40000
KITCHEN	Ceramic/Terrazzo floor	1500	SF	10	15000
	Sheetrock Walls	800	SF	7	5600
	Fiberglass, pipe insulation, and pvc fittings(abated)	200	LF	17	3400
					0
Wash room	Duct Insulation - fiberglass. will need to check.	80	LF	17	1360
	Mechanical Room behind is abated.				0
					0
130-03 Dry	2'x2' CT	400	SF	7	2800
	12"x12" beige FT	400	SF	4	1600
	FT mastic	400	SF	4	1600
					0
130-05 Office	Carpet	200	SF	4	800
	Carpet Mastic	200	SF	4	800
	2'x2' CT	200	SF	7	1400
	Sheetrock	400	SF	7	2800
	Joint Compound	200	SF	7	1400
					0
Conference Rm	Carpet	400	SF	4	1600
	Carpet Mastic	400	SF	4	1600
	2'x2' CT	400	SF	7	2800
	Sheetrock	600	SF	7	4200
	Joint Compound	200	SF	7	1400
					0
Another office	Carpet	200	SF	4	800
	Carpet Mastic	200	SF	4	800
	2'x2' CT	200	SF	7	1400
	Sheetrock	400	SF	7	2800
	Joint Compound	200	SF	7	1400
130-07 Storage	Older 2'x2' CT	200	SF	4	800

	12"x12" beige FT	200	SF	4	800
	FT mastic	200	SF	4	800
130-08 Drink	(3) Roof Drain Fittings insulation	20	LF	17	340
	Pipe – cannot tell if Fiberglass	25	LF	17	425
					0
CHORUS ROOM	2'x2' older CT	400	SF	7	2800
	2'x2' carpet squares w/ yellow mastic on concrete	400	SF	4	1600
	Cove base mastic (brown vinyl)	80	LF	10	800
	Block walls	4000	SF	10	40000
	Tectum wall panels 2'x4', possible glue daubs	600	SF	15	9000
	Sheetrock	400	SF	4	1600
Bathroom	New Biege 12"x12" FT	144	SF	4	576
	FT Mastic yellow	144	SF	4	576
					0
Rm outside bathroom	Metal Sink with black Mastic undercoating	1 each	1 each	50	50
					0
Band offices	Carpet	400	SF	4	1600
	2'x2' CT	400	SF	7	2800
	Sheetrock	600	SF	7	4200
	JC	400	SF	7	2800
					0
BAND ROOM	2'x2' CT	400	SF	7	2800
	Vertical Caulk - Newer	24	LF	10	240
	2'x2' Carpet Squares	400	SF	4	1600
	Tectum Wall Panels – possible glue daubs	600	SF	10	6000
	Vinyl cove base mastic	80	LF	10	800
	Bare corrugated steel deck, no piping	400	SF		0
					388957

SAY \$400,000

ASSUME 25% requires abatement and/or test positive:

CARRY: \$100,00.00 *

* Actual quantities will vary depending on asbestos inspection and analysis results and final design considerations.

Volume estimates based on approximations; and not actual measurements.

5.6

Existing Floor Plans

LEGEND

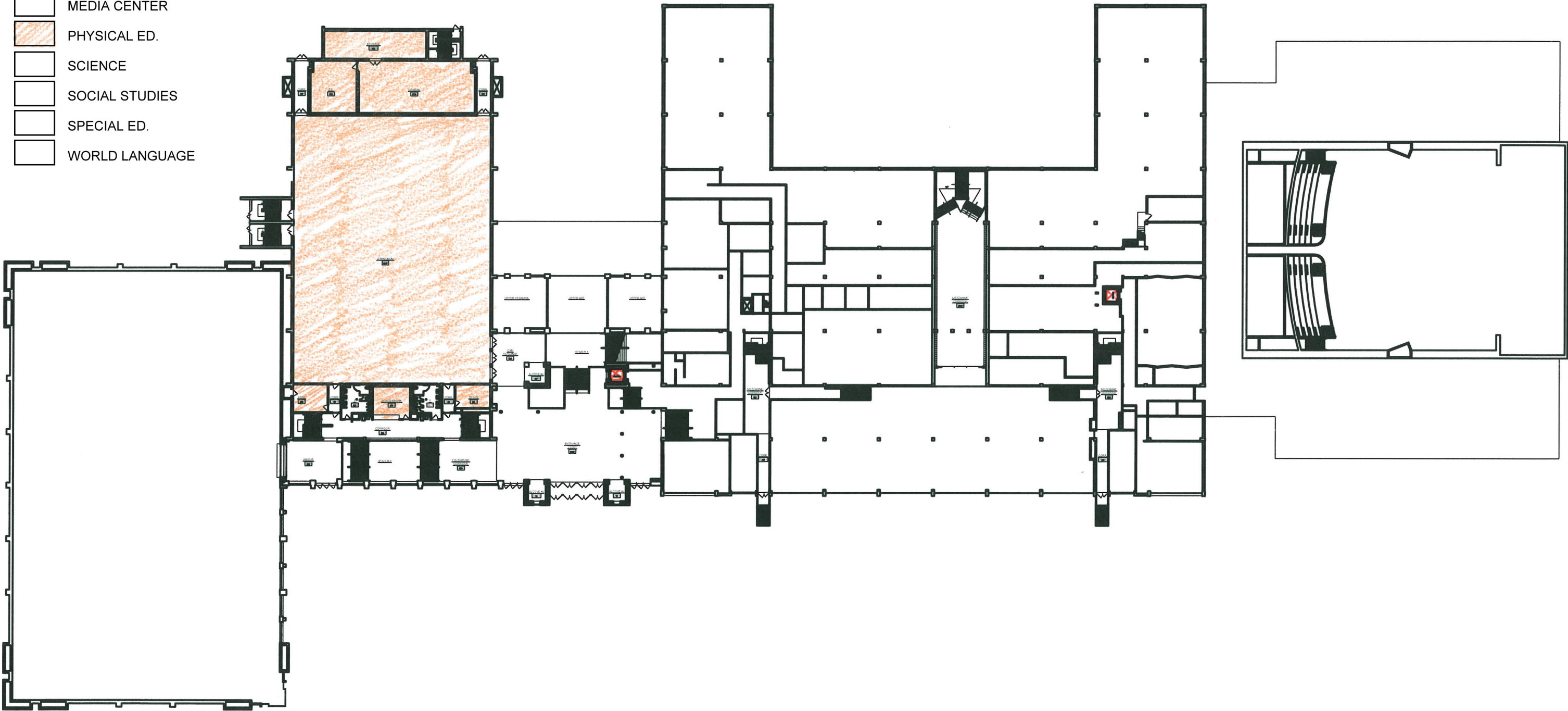
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- ART/ MUSIC
- ENGLISH
- FOOD SERVICE
- GUIDANCE
- MATH
- MEDIA CENTER
- PHYSICAL ED.
- SCIENCE
- SOCIAL STUDIES
- SPECIAL ED.
- WORLD LANGUAGE



LEVEL 1
Scale: 1"=50'

LEGEND

- ADMINISTRATION
- ART/ MUSIC
- ENGLISH
- FOOD SERVICE
- GUIDANCE
- MATH
- MEDIA CENTER
- PHYSICAL ED.
- SCIENCE
- SOCIAL STUDIES
- SPECIAL ED.
- WORLD LANGUAGE



LEVEL 2
Scale: 1"=50'

LEGEND

	ADMINISTRATION
	ART/ MUSIC
	ENGLISH
	FOOD SERVICE
	GUIDANCE
	MATH
	MEDIA CENTER
	PHYSICAL ED.
	SCIENCE
	SOCIAL STUDIES
	SPECIAL ED.
	WORLD LANGUAGE

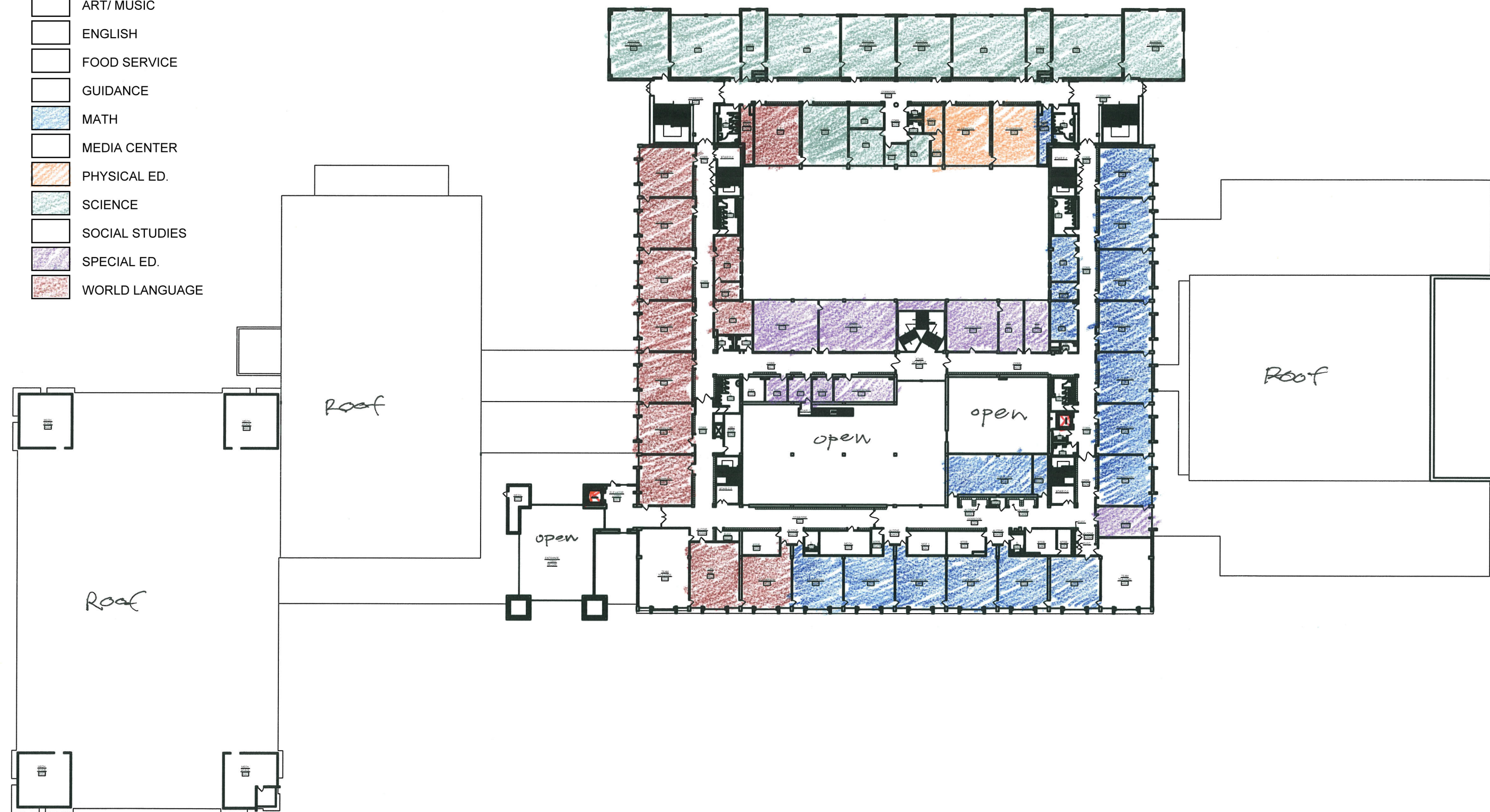


LEVEL 3

Scale: 1"=50'

LEGEND

	ADMINISTRATION
	ART/ MUSIC
	ENGLISH
	FOOD SERVICE
	GUIDANCE
	MATH
	MEDIA CENTER
	PHYSICAL ED.
	SCIENCE
	SOCIAL STUDIES
	SPECIAL ED.
	WORLD LANGUAGE

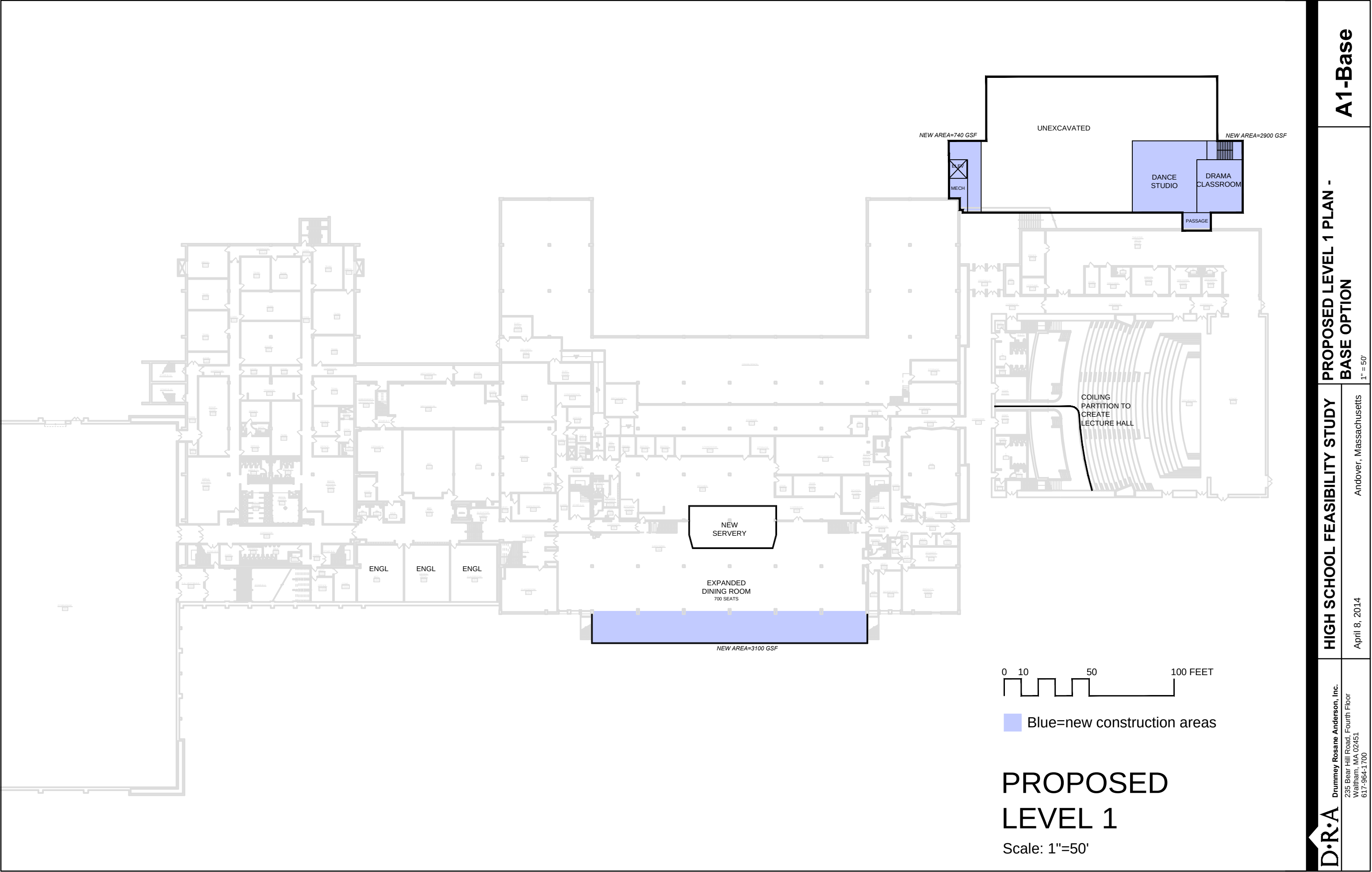


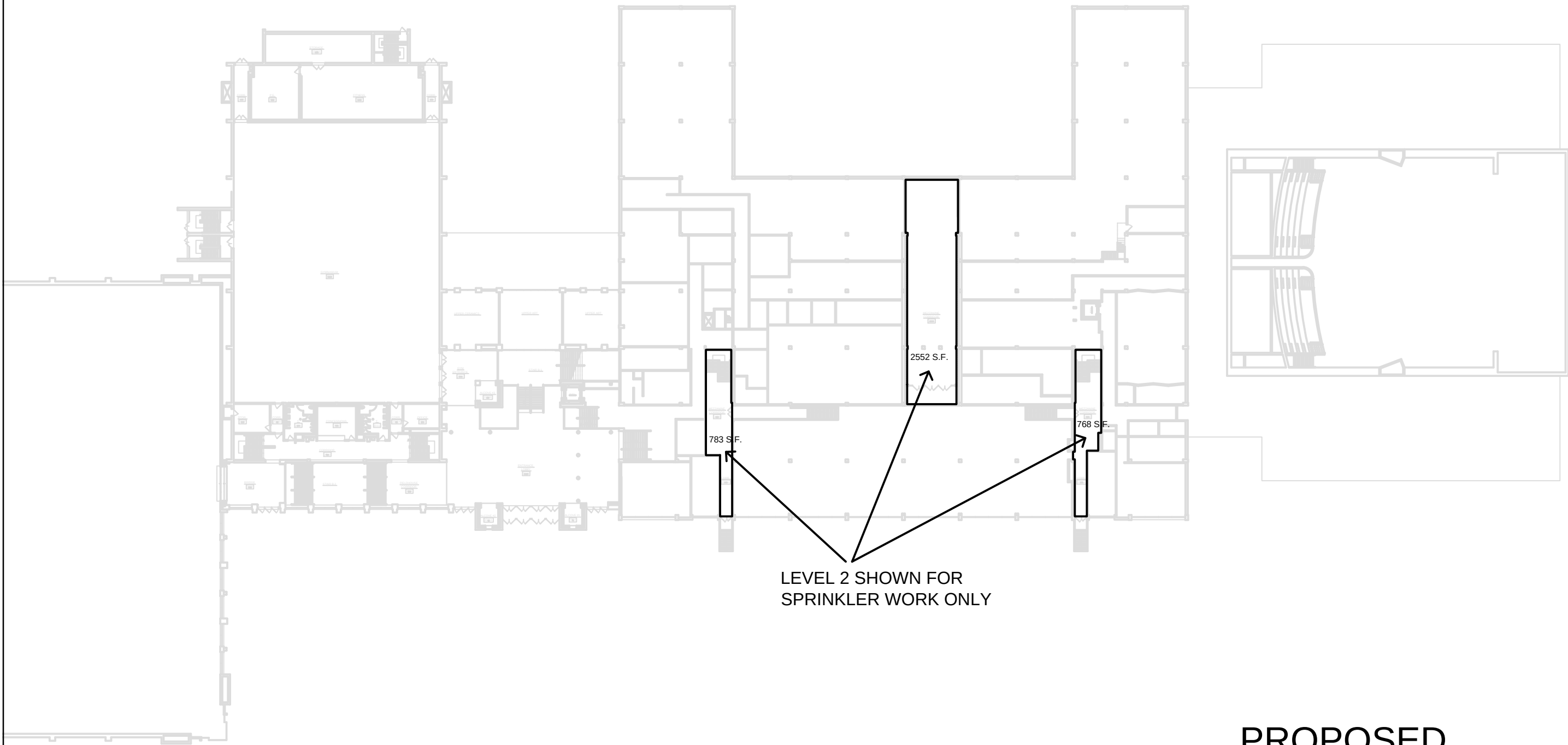
LEVEL 4

Scale: 1"=50'

5.7

Proposed Floor Plans

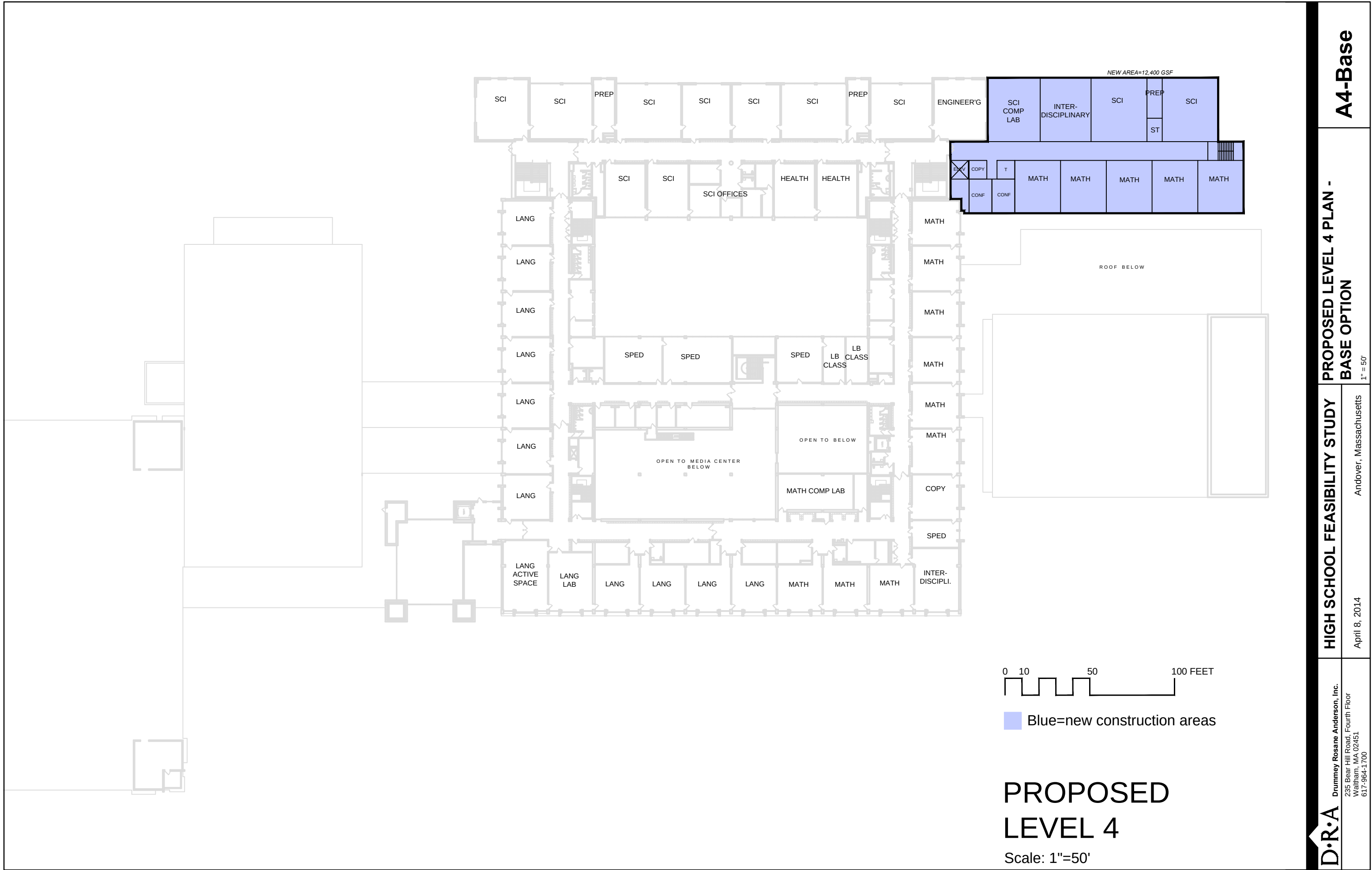


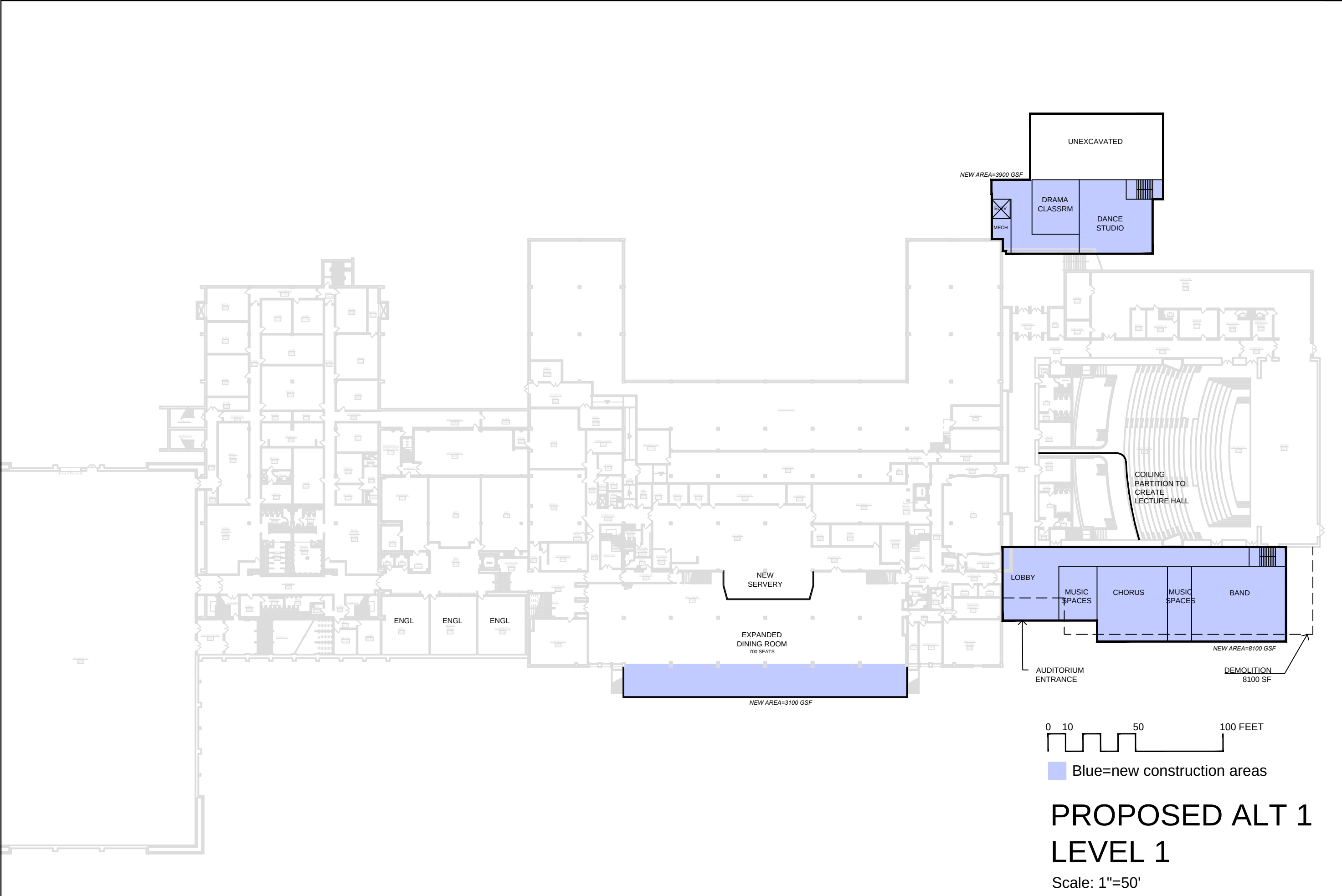


LEVEL 2 SHOWN FOR
SPRINKLER WORK ONLY

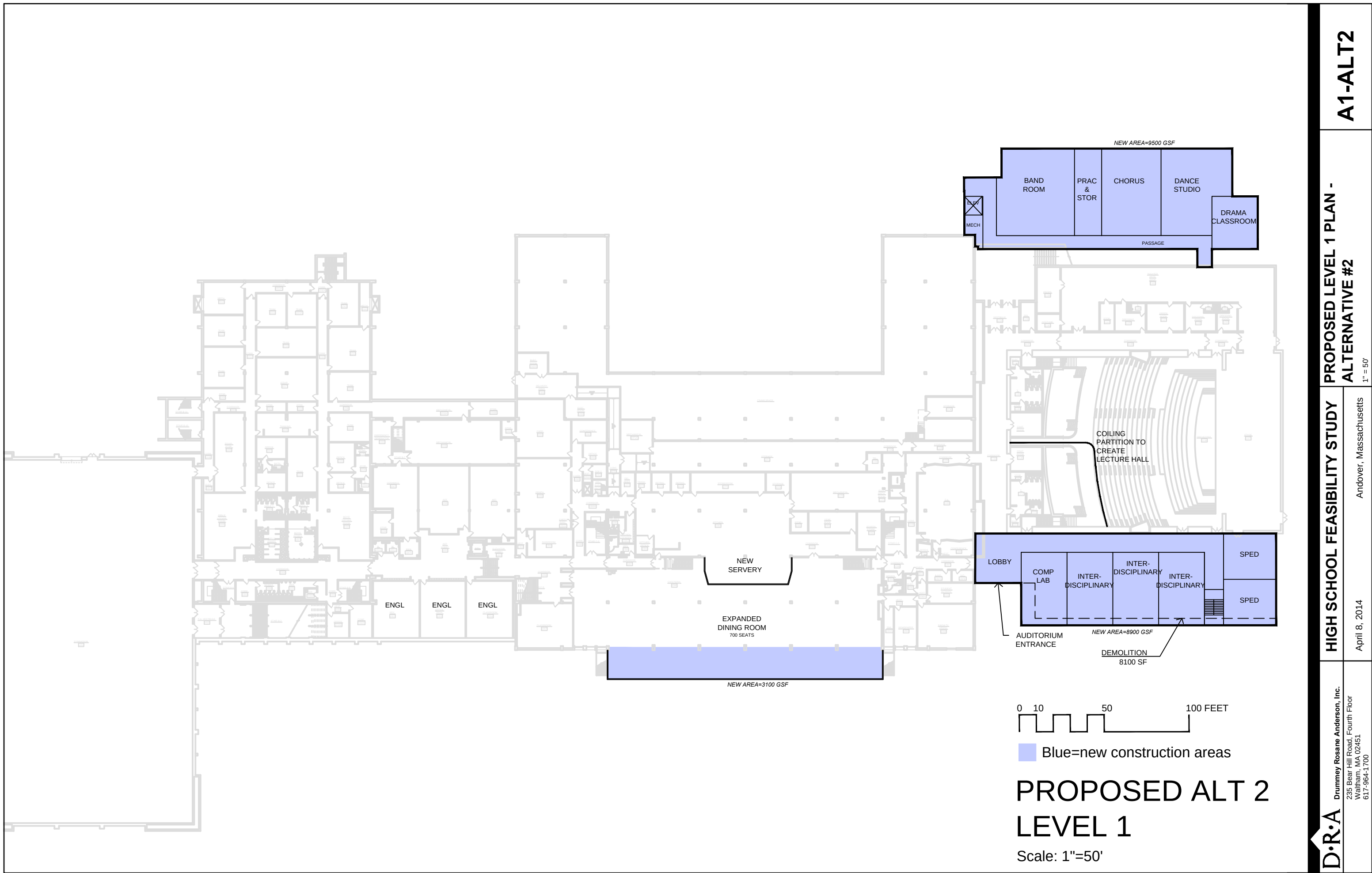
PROPOSED LEVEL 2

Scale: 1"=50'



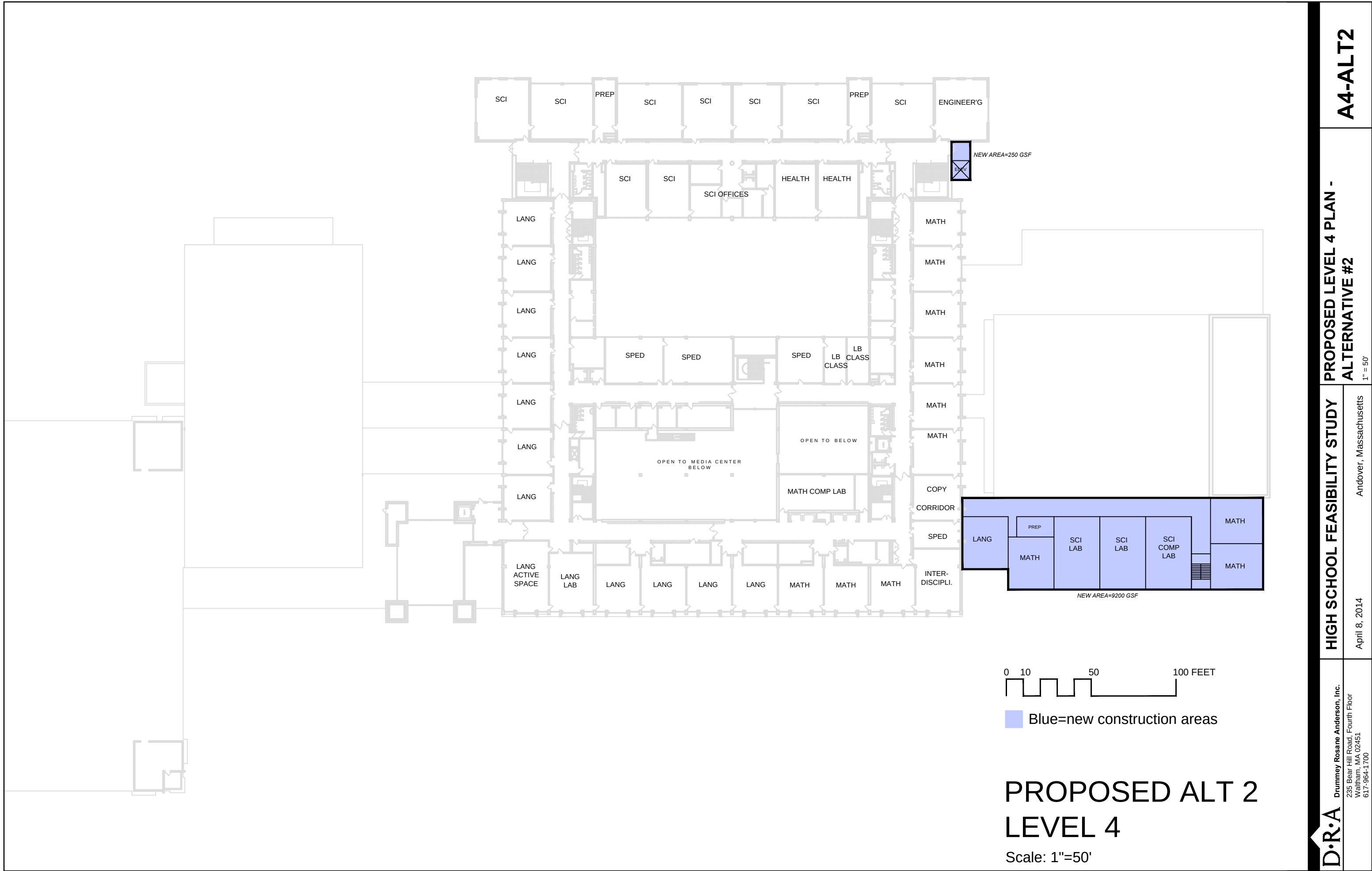








**PROPOSED ALT 2
LEVEL 3**
Scale: 1"=50'



5.8

Conceptual Cost Estimate

Study Andover High School Andover, MA

26-Mar-14

GRAND SUMMARY

	BASE	ALT NO. 1	ALT NO. 2
CLASSROOM SITEWORK	\$725,374	\$683,382	\$683,382
CLASSROOM ADDITION AND SITEWORK	\$9,614,467	\$14,301,926	\$12,674,475
RENOVATION FOR NEW MEANS OF EGRESS	\$100,000	\$100,000	\$100,000
CAFETERIA ADDITION	\$1,324,967	\$1,324,967	\$1,324,967
KITCHEN RENOVATION	\$1,884,706	\$1,884,706	\$1,884,706
CAFETERIA RENOVATION	\$1,729,978	\$1,729,978	\$1,729,978
CAFETERIA SITEWORK	\$552,408	\$552,408	\$552,408
MEDIA CENTER	\$1,740,913	\$1,740,913	\$1,740,913
AUDITORIUM OPERABLE PARTITION	\$269,358	\$269,358	\$269,358
SPRINKLER AT EXISTING SCHOOL	\$2,418,513	\$2,418,513	\$2,418,513
ASBESTOS ABATEMENT ALLOWANCE	\$100,000	\$100,000	\$100,000
	-----	-----	-----
TOTAL CONSTRUCTION COST	\$20,460,686	\$25,106,152	\$23,478,701

PROJECT: Andover High School
LOCATION: Andover, MA
CLIENT: DRA
DATE: 26-Mar-14

BASE OPTION

No.: 12098

CLASSROOM SITEWORK	\$725,374
CLASSROOM ADDITION AND SITEWORK	\$9,614,467
RENOVATION FOR NEW MEANS OF EGRESS	\$100,000
TOTAL CLASSROOM ADDITION	\$10,439,841
CAFETERIA ADDITION	\$1,324,967
KITCHEN RENOVATION	\$1,884,706
CAFETERIA RENOVATION	\$1,729,978
CAFETERIA SITEWORK	\$552,408
TOTAL KITCHEN AND CAFETERIA	\$5,492,060
MEDIA CENTER	\$1,740,913
AUDITORIUM OPERABLE PARTITION	\$269,358
SPRINKLER AT EXISTING SCHOOL	\$2,418,513

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
SITEWORK:				
General Site Prep	30,000	SF	0.30	9,000
Erosion control	475	LF	3.85	1,829
Construction fence	800	LF	9.75	7,800
Construction entrance - allow	1	EA	7,500.00	7,500
Strip and remove top soil	550	CY	15.00	8,250
Clear & grub (7,500 SF)	1	LS	10,000.00	10,000
Remove utilities	550	LF	25.00	13,750
Saw cut roadway	50	LF	4.50	225
Remove pavement	5,000	SF	1.50	7,500
Misc. Site Demolition	1	LS	10,000.00	10,000
Excavate sub base as necessary	200	CY	7.00	1,400
Site cut	1	LS	20,000.00	20,000
Site grading	3,500	SY	2.50	8,750
Ledge removal allowance		NIC		
Paving and Surfacing:				
Bit Pavement - roadway	580	SY	28.00	16,240
4" Concrete walkways	2,000	SF	5.50	11,000
Parking/Traffic signage	1	LS	2,000.00	2,000
Vet. Granite curb	600	LF	32.00	19,200
Parking striping & markings	1	LS	2,000.00	2,000
12" Gravel base @ drive	250	CY	24.00	6,000
New courtyard pavement	1,200	SF	15.00	18,000
Misc. Site pavement	1	LS	40,000.00	40,000
Site Improvements:				
Rebuild areaway stairs	1	LS	45,000.00	45,000
Infiltration field retaining wall	175	LF	200.00	35,000
Misc. Site furnishings	1	LS	15,000.00	15,000
Landscaping:				
6" Loam	400	CY	42.00	16,800
Rake seed and fertilize lawn	1,860	SY	2.00	3,720
Mulch/Planting - allowance	1	LS	10,000.00	10,000
Water Service:				
Relocate water main	200	LF	80.00	16,000
Relocate fire hydrant	1	EA	1,850.00	1,850
Tie into existing	2	LOC	1,000.00	2,000
8" Gate valve	2	EA	1,150.00	2,300
Gas:				
Relocate gas line	300	LF	80.00	24,000
Tie into service	1	LS	5,000.00	5,000
Drainage:				
Infiltration field	2,500	SF	25.00	62,500
Recharger manhole	2	EA	2,500.00	5,000
Wetland outfall	1	LS	7,500.00	7,500
Courtyard drainage	1	LS	5,000.00	5,000
Drain manhole	1	EA	3,000.00	3,000

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
Replace St. CB w/DMH - eccentric top	1	EA	4,500.00	4,500
12" Drain line - connect to exist.	1	LOC	2,000.00	2,000
Drain Lines:				
8" Cast Iron	172	LF	95.00	16,340
12" RCP	60	LF	65.00	3,900
Site Electric:				
Relocate overhead wires	1	LS	10,000.00	10,000
Site lighting	1	LS	10,000.00	10,000
SUBTOTAL				526,854
GENERAL CONDITIONS/REQUIREMENTS		8 %		42,148
SUBTOTAL				569,002
CONTRACTOR PROFIT		3 %		17,070
SUBTOTAL				586,072
PERMIT, BOND & INSURANCE		2.5 %		14,652
SUBTOTAL				600,724
DESIGN CONTINGENCY		15 %		90,109
SUBTOTAL				690,833
ESCALATION (summer 2015)		5 %		34,542
TOTAL CLASSROOM ADDITION SITEWORK				725,374

CLASSROOM ADDITION:

Earthwork	1	LS	40,000.00	40,000
Footing and Foundation wall	28,440	SF	13.00	369,720
Premium for working at existing	1	LS	50,000.00	50,000
Slab on Grade	12,400	SF	11.50	142,600
Structural Steel (13 lbs/sf)	185	TONS	3,500.00	647,500
Fire Proofing	28,400	SF	3.00	85,200
Comp floor deck w/ conc fill	16,000	SF	12.00	192,000
Metal Roof Deck	13,000	SF	3.00	39,000
Exterior Wall Assembly	14,000	SF	84.00	1,176,000
Windows, Storefront, CW - 20%	2,800	SF	85.00	238,000
Roofing - pvc and flashing	12,400	SF	24.00	297,600
Interior Construction	28,440	SF	25.00	711,000
Interior Finishes	28,440	SF	24.00	682,560
Stairs	2	FLTS	32,000.00	64,000
Elevator	3	STOP	48,000.00	144,000
Sprinkler system	28,440	SF	4.00	113,760
Plumbing	28,440	SF	10.00	284,400
HVAC	28,440	SF	20.00	568,800
Electrical	28,440	SF	26.00	739,440
Furnishings and Equipment	28,400	SF	14.00	397,600

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
SUBTOTAL				6,983,180
GENERAL CONDITIONS/REQUIREMENTS		8 %		558,654
SUBTOTAL				7,541,834
CONTRACTOR PROFIT		3 %		226,255
SUBTOTAL				7,768,089
PERMIT, BOND & INSURANCE		2.5 %		194,202
SUBTOTAL				7,962,292
DESIGN CONTINGENCY		15 %		1,194,344
SUBTOTAL				9,156,635
ESCALATION (summer 2015)		5 %		457,832
TOTAL CLASSROOM ADDITION				9,614,467

CAFETERIA ADDITION:

Demolish existing exterior	1,600	SF	10.00	16,000
Earthwork	1	LS	20,000.00	20,000
Footing and Foundation wall	3,100	SF	15.00	46,500
Premium for working at existing	1	LS	15,000.00	15,000
Slab on Grade	3,100	SF	11.50	35,650
Structural Steel (13 lbs/sf)	21	TONS	3,500.00	73,500
Metal Roof Deck	3,100	SF	3.00	9,300
Exterior Wall Assembly	2,750	SF	50.00	137,500
Windows, Storefront, CW	1,960	SF	85.00	166,600
Roofing - pvc and flashing	3,100	SF	24.00	74,400
Interior Construction	3,100	SF	25.00	77,500
Interior Finishes	3,100	SF	24.00	74,400
Sprinkler system	3,100	SF	4.00	12,400
Plumbing	3,100	SF	8.00	24,800
HVAC	3,100	SF	15.00	46,500
Electrical	3,100	SF	26.00	80,600
Furnishings and Equipment	3,100	SF	7.00	21,700
Tie into existing structure and patch	1	LS	30,000.00	30,000
SUBTOTAL				962,350
GENERAL CONDITIONS/REQUIREMENTS		8 %		76,988
SUBTOTAL				1,039,338
CONTRACTOR PROFIT		3 %		31,180
SUBTOTAL				1,070,518
PERMIT, BOND & INSURANCE		2.5 %		26,763
SUBTOTAL				1,097,281
DESIGN CONTINGENCY		15 %		164,592
SUBTOTAL				1,261,873
ESCALATION (summer 2015)		5 %		63,094

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
TOTAL CAFETERIA ADDITION				1,324,967
KITCHEN RENOVATION				
Interior Demolition	7,450	SF	10.00	74,500
Remove and Replace slab at plumbing	4,000	SF	15.00	60,000
Interior Construction	7,450	SF	10.00	74,500
Interior Finish	7,450	SF	34.00	253,300
Kitchen equipment	1	LS	400,000.00	400,000
Sprinkler system	7,450	SF	4.00	29,800
Plumbing	7,450	SF	18.00	134,100
HVAC	7,450	SF	20.00	149,000
Electrical	7,450	SF	26.00	193,700
SUBTOTAL				1,368,900
GENERAL CONDITIONS/REQUIREMENTS		8 %		109,512
SUBTOTAL				1,478,412
CONTRACTOR PROFIT		3 %		44,352
SUBTOTAL				1,522,764
PERMIT, BOND & INSURANCE		2.5 %		38,069
SUBTOTAL				1,560,833
DESIGN CONTINGENCY		15 %		234,125
SUBTOTAL				1,794,958
ESCALATION (summer 2015)		5 %		89,748
TOTAL KITCHEN RENOVATION				1,884,706
CAFETERIA RENOVATION				
Interior Demolition	9,377	SF	10.00	93,770
Interior Construction	9,377	SF	10.00	93,770
Interior Finish	9,377	SF	34.00	318,818
Sprinkler system	9,377	SF	4.00	37,508
Plumbing	9,377	SF	18.00	168,786
HVAC	9,377	SF	20.00	187,540
Electrical	9,377	SF	26.00	243,802
Furnishings and Equipment	9,377	SF	12.00	112,524
SUBTOTAL				1,256,518
GENERAL CONDITIONS/REQUIREMENTS		8 %		100,521
SUBTOTAL				1,357,039
CONTRACTOR PROFIT		3 %		40,711
SUBTOTAL				1,397,751

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
PERMIT, BOND & INSURANCE		2.5 %		34,944
SUBTOTAL				1,432,694
DESIGN CONTINGENCY		15 %		214,904
SUBTOTAL				1,647,599
ESCALATION (summer 2015)		5 %		82,380
TOTAL CAFETERIA RENOVATION				1,729,978
SITEWORK:				
General Site Prep	1	LS	10,000.00	10,000
Erosion control	500	LF	3.85	1,925
Construction fence	800	LF	9.75	7,800
Construction entrance - allow	1	EA	7,500.00	7,500
Remove selective plaza area	6,000	SF	8.00	48,000
Remove utilities	1	LS	5,000.00	5,000
Misc. Site Demolition	1	LS	10,000.00	10,000
Paving and Surfacing:				
Rebuild plaza and step	6,000	SF	30.00	180,000
Replace stair structures	2	EA	8,500.00	17,000
Site Improvements:				
Misc. Site furnishings	1	LS	15,000.00	15,000
Landscaping:				
Restore front lawn	1	LS	10,000.00	10,000
Mulch/Planting - allowance	1	LS	20,000.00	20,000
Sanitary:				
Relocate drain line	250	LF	85.00	21,250
Tie into existing	2	LOC	1,000.00	2,000
Drainage:				
Rework plaza drainage	1	LS	15,000.00	15,000
Drain Lines:				
Relocate drain line	250	LF	75.00	18,750
Tie into existing	2	LOC	1,000.00	2,000
Site Electric:				
Site lighting	1	LS	10,000.00	10,000
SUBTOTAL				401,225
GENERAL CONDITIONS/REQUIREMENTS		8 %		32,098
SUBTOTAL				433,323
CONTRACTOR PROFIT		3 %		13,000
SUBTOTAL				446,323
PERMIT, BOND & INSURANCE		2.5 %		11,158

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
SUBTOTAL				457,481
DESIGN CONTINGENCY		15 %		68,622
SUBTOTAL				526,103
ESCALATION (summer 2015)		5 %		26,305
TOTAL CAFETERIA SITEWORK				552,408
MEDIA CENTER RENOVATION				
Interior Demolition	10,790	SF	6.00	64,740
Interior Construction	10,790	SF	5.00	53,950
Interior Finish	10,790	SF	20.00	215,800
Sprinkler system	10,790	SF	4.00	43,160
Plumbing	10,790	SF	18.00	194,220
HVAC - rework distribution	10,790	SF	15.00	161,850
Electrical	10,790	SF	20.00	215,800
Furnishings and Equipment	10,790	SF	6.00	64,740
Skylight:				
Remove Concrete roof deck	1,500	SF	14.00	21,000
Reframe new opening (12 lbs/sf)	9	TONS	3,800.00	34,200
Aluminum Frame skylight	1,500	SF	130.00	195,000
SUBTOTAL				1,264,460
GENERAL CONDITIONS/REQUIREMENTS		8 %		101,157
SUBTOTAL				1,365,617
CONTRACTOR PROFIT		3 %		40,969
SUBTOTAL				1,406,585
PERMIT, BOND & INSURANCE		2.5 %		35,165
SUBTOTAL				1,441,750
DESIGN CONTINGENCY		15 %		216,262
SUBTOTAL				1,658,012
ESCALATION (summer 2015)		5 %		82,901
TOTAL MEDIA CENTER RENOVATION				1,740,913
AUDITORIUM OPERABLE PARTITION				
Remove Partition	105	LF	88.00	9,240
New 16' Operable Partition	1680	SF	105.00	176,400
Misc. Cut and patch	1	LS	10,000.00	10,000
SUBTOTAL				195,640
GENERAL CONDITIONS/REQUIREMENTS		8 %		15,651

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
SUBTOTAL				211,291
CONTRACTOR PROFIT		3 %		6,339
SUBTOTAL				217,630
PERMIT, BOND & INSURANCE		2.5 %		5,441
SUBTOTAL				223,071
DESIGN CONTINGENCY		15 %		33,461
SUBTOTAL				256,531
ESCALATION (summer 2015)		5 %		12,827
TOTAL OPERABLE PARTITION				269,358
SPRINKLER AT EXISTING SCHOOL				
Cut and Patch as necessary	212,923	SF	4.00	851,692
New Sprinkler system	212,923	SF	4.25	904,923
SUBTOTAL				1,756,615
GENERAL CONDITIONS/REQUIREMENTS		8 %		140,529
SUBTOTAL				1,897,144
CONTRACTOR PROFIT		3 %		56,914
SUBTOTAL				1,954,058
PERMIT, BOND & INSURANCE		2.5 %		48,851
SUBTOTAL				2,002,910
DESIGN CONTINGENCY		15 %		300,436
SUBTOTAL				2,303,346
ESCALATION (summer 2015)		5 %		115,167
TOTAL SPRINKLER AT EXISTING				2,418,513

PROJECT: Andover High School
LOCATION: Andover, MA
CLIENT: DRA
DATE: 26-Mar-14

ALT NO. 1 OPTION

No.: 12098

CLASSROOM SITEWORK	\$683,382
CLASSROOM ADDITION AND SITEWORK	\$14,301,926
RENOVATION FOR NEW MEANS OF EGRESS	\$100,000
TOTAL CLASSROOM ADDITION	\$15,085,307
CAFETERIA ADDITION	\$1,324,967
KITCHEN RENOVATION	\$1,884,706
CAFETERIA RENOVATION	\$1,729,978
CAFETERIA SITEWORK	\$552,408
TOTAL KITCHEN AND CAFETERIA	\$5,492,060
MEDIA CENTER	\$1,740,913
AUDITORIUM OPERABLE PARTITION	\$269,358
SPRINKLER AT EXISTING SCHOOL	\$2,418,513

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
SITEWORK:				
General Site Prep	30,000	SF	0.30	9,000
Erosion control	475	LF	3.85	1,829
Construction fence	800	LF	9.75	7,800
Construction entrance - allow	1	EA	7,500.00	7,500
Strip and remove top soil	550	CY	15.00	8,250
Clear & grub (7,500 SF)	1	LS	10,000.00	10,000
Remove utilities	550	LF	25.00	13,750
Saw cut roadway	50	LF	4.50	225
Remove pavement	5,000	SF	1.50	7,500
Misc. Site Demolition	1	LS	10,000.00	10,000
Excavate sub base as necessary	200	CY	7.00	1,400
Site cut	1	LS	20,000.00	20,000
Site grading	3,500	SY	2.50	8,750
Ledge removal allowance		NIC		
Paving and Surfacing:				
Bit Pavement - roadway	580	SY	28.00	16,240
4" Concrete walkways	1,000	SF	5.50	5,500
Parking/Traffic signage	1	LS	2,000.00	2,000
Vet. Granite curb	600	LF	32.00	19,200
Parking striping & markings	1	LS	2,000.00	2,000
12" Gravel base @ drive	250	CY	24.00	6,000
New courtyard pavement	1,200	SF	15.00	18,000
Misc. Site pavement	1	LS	15,000.00	15,000
Site Improvements:				
Rebuild areaway stairs	1	LS	45,000.00	45,000
Infiltration field retaining wall	175	LF	200.00	35,000
Misc. Site furnishings	1	LS	15,000.00	15,000
Landscaping:				
6" Loam	400	CY	42.00	16,800
Rake seed and fertilize lawn	1,860	SY	2.00	3,720
Mulch/Planting - allowance	1	LS	10,000.00	10,000
Water Service:				
Relocate water main	200	LF	80.00	16,000
Relocate fire hydrant	1	EA	1,850.00	1,850
Tie into existing	2	LOC	1,000.00	2,000
8" Gate valve	2	EA	1,150.00	2,300
Gas:				
Relocate gas line	300	LF	80.00	24,000
Tie into service	1	LS	5,000.00	5,000
Drainage:				
Infiltration field	2,500	SF	25.00	62,500
Recharger manhole	2	EA	2,500.00	5,000
Wetland outfall	1	LS	7,500.00	7,500
Courtyard drainage	1	LS	5,000.00	5,000
Drain manhole	1	EA	3,000.00	3,000

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
Replace St. CB w/DMH - eccentric top	1	EA	4,500.00	4,500
12" Drain line - connect to exist.	1	LOC	2,000.00	2,000
Drain Lines:				
8" Cast Iron	172	LF	95.00	16,340
12" RCP	60	LF	65.00	3,900
Site Electric:				
Relocate overhead wires	1	LS	10,000.00	10,000
Site lighting	1	LS	10,000.00	10,000
SUBTOTAL				496,354
GENERAL CONDITIONS/REQUIREMENTS		8 %		39,708
SUBTOTAL				536,062
CONTRACTOR PROFIT		3 %		16,082
SUBTOTAL				552,144
PERMIT, BOND & INSURANCE		2.5 %		13,804
SUBTOTAL				565,948
DESIGN CONTINGENCY		15 %		84,892
SUBTOTAL				650,840
ESCALATION (summer 2015)		5 %		32,542
TOTAL CLASSROOM ADDITION SITEWORK				683,382

CLASSROOM ADDITION:

Demolish existing structure	24,300	SF	10.00	243,000
Earthwork	1	LS	60,000.00	60,000
Footing and Foundation wall	42,300	SF	13.00	549,900
Premium for working at existing	1	LS	75,000.00	75,000
Slab on Grade	14,800	SF	11.50	170,200
Structural Steel (13 lbs/sf)	275	TONS	3,500.00	962,325
Fire Proofing	28,400	SF	3.00	85,200
Comp floor deck w/ conc fill	27,500	SF	12.00	330,000
Metal Roof Deck	14,800	SF	3.00	44,400
Fire wall at auditorium	8,786	SF	25.00	219,650
Exterior Wall Assembly	18,000	SF	84.00	1,512,000
Windows, Storefront, CW - 20%	3,600	SF	85.00	306,000
Roofing - pvc and flashing	14,800	SF	24.00	355,200
Interior Construction	42,300	SF	25.00	1,057,500
Interior Finishes	42,300	SF	24.00	1,015,200
Stairs	4	FLTS	32,000.00	128,000
Elevator	3	STOP	48,000.00	144,000
Sprinkler system	42,300	SF	4.00	169,200
Plumbing	42,300	SF	10.00	423,000
HVAC	42,300	SF	20.00	846,000
Electrical	42,300	SF	26.00	1,099,800
Furnishings and Equipment	42,300	SF	14.00	592,200

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
SUBTOTAL				10,387,775
GENERAL CONDITIONS/REQUIREMENTS		8 %		831,022
SUBTOTAL				11,218,797
CONTRACTOR PROFIT		3 %		336,564
SUBTOTAL				11,555,361
PERMIT, BOND & INSURANCE		2.5 %		288,884
SUBTOTAL				11,844,245
DESIGN CONTINGENCY		15 %		1,776,637
SUBTOTAL				13,620,882
ESCALATION (summer 2015)		5 %		681,044
TOTAL CLASSROOM ADDITION				14,301,926

CAFETERIA ADDITION:

Demolish existing exterior	1,600	SF	10.00	16,000
Earthwork	1	LS	20,000.00	20,000
Footing and Foundation wall	3,100	SF	15.00	46,500
Premium for working at existing	1	LS	15,000.00	15,000
Slab on Grade	3,100	SF	11.50	35,650
Structural Steel (13 lbs/sf)	21	TONS	3,500.00	73,500
Metal Roof Deck	3,100	SF	3.00	9,300
Exterior Wall Assembly	2,750	SF	50.00	137,500
Windows, Storefront, CW	1,960	SF	85.00	166,600
Roofing - pvc and flashing	3,100	SF	24.00	74,400
Interior Construction	3,100	SF	25.00	77,500
Interior Finishes	3,100	SF	24.00	74,400
Sprinkler system	3,100	SF	4.00	12,400
Plumbing	3,100	SF	8.00	24,800
HVAC	3,100	SF	15.00	46,500
Electrical	3,100	SF	26.00	80,600
Furnishings and Equipment	3,100	SF	7.00	21,700
Tie into existing structure and patch	1	LS	30,000.00	30,000

SUBTOTAL				962,350
GENERAL CONDITIONS/REQUIREMENTS		8 %		76,988
SUBTOTAL				1,039,338
CONTRACTOR PROFIT		3 %		31,180
SUBTOTAL				1,070,518
PERMIT, BOND & INSURANCE		2.5 %		26,763
SUBTOTAL				1,097,281
DESIGN CONTINGENCY		15 %		164,592

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
SUBTOTAL				1,261,873
ESCALATION (summer 2015)		5 %		63,094
TOTAL CAFETERIA ADDITION				1,324,967
KITCHEN RENOVATION				
Interior Demolition	7,450	SF	10.00	74,500
Remove and Replace slab at plumbing	4,000	SF	15.00	60,000
Interior Construction	7,450	SF	10.00	74,500
Interior Finish	7,450	SF	34.00	253,300
Kitchen equipment	1	LS	400,000.00	400,000
Sprinkler system	7,450	SF	4.00	29,800
Plumbing	7,450	SF	18.00	134,100
HVAC	7,450	SF	20.00	149,000
Electrical	7,450	SF	26.00	193,700
SUBTOTAL				1,368,900
GENERAL CONDITIONS/REQUIREMENTS		8 %		109,512
SUBTOTAL				1,478,412
CONTRACTOR PROFIT		3 %		44,352
SUBTOTAL				1,522,764
PERMIT, BOND & INSURANCE		2.5 %		38,069
SUBTOTAL				1,560,833
DESIGN CONTINGENCY		15 %		234,125
SUBTOTAL				1,794,958
ESCALATION (summer 2015)		5 %		89,748
TOTAL KITCHEN RENOVATION				1,884,706

CAFETERIA RENOVATION

Interior Demolition	9,377	SF	10.00	93,770
Interior Construction	9,377	SF	10.00	93,770
Interior Finish	9,377	SF	34.00	318,818
Sprinkler system	9,377	SF	4.00	37,508
Plumbing	9,377	SF	18.00	168,786
HVAC	9,377	SF	20.00	187,540
Electrical	9,377	SF	26.00	243,802
Furnishings and Equipment	9,377	SF	12.00	112,524
SUBTOTAL				1,256,518
GENERAL CONDITIONS/REQUIREMENTS		8 %		100,521
SUBTOTAL				1,357,039
CONTRACTOR PROFIT		3 %		40,711

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
SUBTOTAL				1,397,751
PERMIT, BOND & INSURANCE		2.5 %		34,944
SUBTOTAL				1,432,694
DESIGN CONTINGENCY		15 %		214,904
SUBTOTAL				1,647,599
ESCALATION (summer 2015)		5 %		82,380
TOTAL CAFETERIA RENOVATION				1,729,978
SITEWORK:				
General Site Prep	1	LS	10,000.00	10,000
Erosion control	500	LF	3.85	1,925
Construction fence	800	LF	9.75	7,800
Construction entrance - allow	1	EA	7,500.00	7,500
Remove selective plaza area	6,000	SF	8.00	48,000
Remove utilities	1	LS	5,000.00	5,000
Misc. Site Demolition	1	LS	10,000.00	10,000
Paving and Surfacing:				
Rebuild plaza and step	6,000	SF	30.00	180,000
Replace stair structures	2	EA	8,500.00	17,000
Site Improvements:				
Misc. Site furnishings	1	LS	15,000.00	15,000
Landscaping:				
Restore front lawn	1	LS	10,000.00	10,000
Mulch/Planting - allowance	1	LS	20,000.00	20,000
Sanitary:				
Relocate drain line	250	LF	85.00	21,250
Tie into existing	2	LOC	1,000.00	2,000
Drainage:				
Rework plaza drainage	1	LS	15,000.00	15,000
Drain Lines:				
Relocate drain line	250	LF	75.00	18,750
Tie into existing	2	LOC	1,000.00	2,000
Site Electric:				
Site lighting	1	LS	10,000.00	10,000
SUBTOTAL				401,225
GENERAL CONDITIONS/REQUIREMENTS		8 %		32,098
SUBTOTAL				433,323
CONTRACTOR PROFIT		3 %		13,000

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
SUBTOTAL				446,323
PERMIT, BOND & INSURANCE		2.5 %		11,158
SUBTOTAL				457,481
DESIGN CONTINGENCY		15 %		68,622
SUBTOTAL				526,103
ESCALATION (summer 2015)		5 %		26,305
TOTAL CAFETERIA SITEWORK				552,408
MEDIA CENTER RENOVATION				
Interior Demolition	10,790	SF	6.00	64,740
Interior Construction	10,790	SF	5.00	53,950
Interior Finish	10,790	SF	20.00	215,800
Sprinkler system	10,790	SF	4.00	43,160
Plumbing	10,790	SF	18.00	194,220
HVAC - rework distribution	10,790	SF	15.00	161,850
Electrical	10,790	SF	20.00	215,800
Furnishings and Equipment	10,790	SF	6.00	64,740
Skylight:				
Remove Concrete roof deck	1,500	SF	14.00	21,000
Reframe new opening (12 lbs/sf)	9	TONS	3,800.00	34,200
Aluminum Frame skylight	1,500	SF	130.00	195,000
SUBTOTAL				1,264,460
GENERAL CONDITIONS/REQUIREMENTS		8 %		101,157
SUBTOTAL				1,365,617
CONTRACTOR PROFIT		3 %		40,969
SUBTOTAL				1,406,585
PERMIT, BOND & INSURANCE		2.5 %		35,165
SUBTOTAL				1,441,750
DESIGN CONTINGENCY		15 %		216,262
SUBTOTAL				1,658,012
ESCALATION (summer 2015)		5 %		82,901
TOTAL MEDIA CENTER RENOVATION				1,740,913
AUDITORIUM OPERABLE PARTITION				
Remove Partition	105	LF	88.00	9,240
New 16' Operable Partition	1680	SF	105.00	176,400
Misc. Cut and patch	1	LS	10,000.00	10,000
SUBTOTAL				195,640

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
GENERAL CONDITIONS/REQUIREMENTS		8 %		15,651
SUBTOTAL				211,291
CONTRACTOR PROFIT		3 %		6,339
SUBTOTAL				217,630
PERMIT, BOND & INSURANCE		2.5 %		5,441
SUBTOTAL				223,071
DESIGN CONTINGENCY		15 %		33,461
SUBTOTAL				256,531
ESCALATION (summer 2015)		5 %		12,827
TOTAL OPERABLE PARTITION				269,358
SPRINKLER AT EXISTING SCHOOL				
Cut and Patch as necessary	212,923	SF	4.00	851,692
New Sprinkler system	212,923	SF	4.25	904,923
SUBTOTAL				1,756,615
GENERAL CONDITIONS/REQUIREMENTS		8 %		140,529
SUBTOTAL				1,897,144
CONTRACTOR PROFIT		3 %		56,914
SUBTOTAL				1,954,058
PERMIT, BOND & INSURANCE		2.5 %		48,851
SUBTOTAL				2,002,910
DESIGN CONTINGENCY		15 %		300,436
SUBTOTAL				2,303,346
ESCALATION (summer 2015)		5 %		115,167
TOTAL SPRINKLER AT EXISTING				2,418,513

PROJECT: Andover High School
LOCATION: Andover, MA
CLIENT: DRA
DATE: 26-Mar-14

ALT NO. 2 OPTION

No.: 12098

CLASSROOM SITEWORK	\$683,382
CLASSROOM ADDITION AND SITEWORK	\$12,674,475
RENOVATION FOR NEW MEANS OF EGRESS	\$100,000
TOTAL CLASSROOM ADDITION	\$13,457,857
CAFETERIA ADDITION	\$1,324,967
KITCHEN RENOVATION	\$1,884,706
CAFETERIA RENOVATION	\$1,729,978
CAFETERIA SITEWORK	\$552,408
TOTAL KITCHEN AND CAFETERIA	\$5,492,060
MEDIA CENTER	\$1,740,913
AUDITORIUM OPERABLE PARTITION	\$269,358
SPRINKLER AT EXISTING SCHOOL	\$2,418,513

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
SITEWORK:				
General Site Prep	30,000	SF	0.30	9,000
Erosion control	475	LF	3.85	1,829
Construction fence	800	LF	9.75	7,800
Construction entrance - allow	1	EA	7,500.00	7,500
Strip and remove top soil	550	CY	15.00	8,250
Clear & grub (7,500 SF)	1	LS	10,000.00	10,000
Remove utilities	550	LF	25.00	13,750
Saw cut roadway	50	LF	4.50	225
Remove pavement	5,000	SF	1.50	7,500
Misc. Site Demolition	1	LS	10,000.00	10,000
Excavate sub base as necessary	200	CY	7.00	1,400
Site cut	1	LS	20,000.00	20,000
Site grading	3,500	SY	2.50	8,750
Ledge removal allowance		NIC		
Paving and Surfacing:				
Bit Pavement - roadway	580	SY	28.00	16,240
4" Concrete walkways	1,000	SF	5.50	5,500
Parking/Traffic signage	1	LS	2,000.00	2,000
Vet. Granite curb	600	LF	32.00	19,200
Parking striping & markings	1	LS	2,000.00	2,000
12" Gravel base @ drive	250	CY	24.00	6,000
New courtyard pavement	1,200	SF	15.00	18,000
Misc. Site pavement	1	LS	15,000.00	15,000
Site Improvements:				
Rebuild areaway stairs	1	LS	45,000.00	45,000
Infiltration field retaining wall	175	LF	200.00	35,000
Misc. Site furnishings	1	LS	15,000.00	15,000
Landscaping:				
6" Loam	400	CY	42.00	16,800
Rake seed and fertilize lawn	1,860	SY	2.00	3,720
Mulch/Planting - allowance	1	LS	10,000.00	10,000
Water Service:				
Relocate water main	200	LF	80.00	16,000
Relocate fire hydrant	1	EA	1,850.00	1,850
Tie into existing	2	LOC	1,000.00	2,000
8" Gate valve	2	EA	1,150.00	2,300
Gas:				
Relocate gas line	300	LF	80.00	24,000
Tie into service	1	LS	5,000.00	5,000
Drainage:				
Infiltration field	2,500	SF	25.00	62,500
Recharger manhole	2	EA	2,500.00	5,000
Wetland outfall	1	LS	7,500.00	7,500
Courtyard drainage	1	LS	5,000.00	5,000
Drain manhole	1	EA	3,000.00	3,000

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
Replace St. CB w/DMH - eccentric top	1	EA	4,500.00	4,500
12" Drain line - connect to exist.	1	LOC	2,000.00	2,000
Drain Lines:				
8" Cast Iron	172	LF	95.00	16,340
12" RCP	60	LF	65.00	3,900
Site Electric:				
Relocate overhead wires	1	LS	10,000.00	10,000
Site lighting	1	LS	10,000.00	10,000
SUBTOTAL				496,354
GENERAL CONDITIONS/REQUIREMENTS		8 %		39,708
SUBTOTAL				536,062
CONTRACTOR PROFIT		3 %		16,082
SUBTOTAL				552,144
PERMIT, BOND & INSURANCE		2.5 %		13,804
SUBTOTAL				565,948
DESIGN CONTINGENCY		15 %		84,892
SUBTOTAL				650,840
ESCALATION (summer 2015)		5 %		32,542
TOTAL CLASSROOM ADDITION SITEWORK				683,382

CLASSROOM ADDITION:

Demolish existing structure	24,300	SF	10.00	243,000
Earthwork	1	LS	60,000.00	60,000
Footing and Foundation wall	37,300	SF	13.00	484,900
Premium for working at existing	1	LS	75,000.00	75,000
Slab on Grade	18,400	SF	11.50	211,600
Structural Steel (13 lbs/sf)	242	TONS	3,500.00	848,575
Fire Proofing	37,300	SF	3.00	111,900
Comp floor deck w/ conc fill	18,900	SF	12.00	226,800
Metal Roof Deck	18,400	SF	3.00	55,200
Fire wall at auditorium	8,786	SF	25.00	219,650
Exterior Wall Assembly	13,400	SF	84.00	1,125,600
Windows, Storefront, CW - 20%	3,600	SF	85.00	306,000
Roofing - pvc and flashing	18,400	SF	24.00	441,600
Interior Construction	37,300	SF	25.00	932,500
Interior Finishes	37,300	SF	24.00	895,200
Stairs	2	FLTS	32,000.00	64,000
Elevator	3	STOP	48,000.00	144,000
Sprinkler system	37,300	SF	4.00	149,200
Plumbing	37,300	SF	10.00	373,000
HVAC	37,300	SF	20.00	746,000
Electrical	37,300	SF	26.00	969,800
Furnishings and Equipment	37,300	SF	14.00	522,200

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
SUBTOTAL				9,205,725
GENERAL CONDITIONS/REQUIREMENTS		8 %		736,458
SUBTOTAL				9,942,183
CONTRACTOR PROFIT		3 %		298,265
SUBTOTAL				10,240,448
PERMIT, BOND & INSURANCE		2.5 %		256,011
SUBTOTAL				10,496,460
DESIGN CONTINGENCY		15 %		1,574,469
SUBTOTAL				12,070,929
ESCALATION (summer 2015)		5 %		603,546
TOTAL CLASSROOM ADDITION				12,674,475

CAFETERIA ADDITION:

Demolish existing exterior	1,600	SF	10.00	16,000
Earthwork	1	LS	20,000.00	20,000
Footing and Foundation wall	3,100	SF	15.00	46,500
Premium for working at existing	1	LS	15,000.00	15,000
Slab on Grade	3,100	SF	11.50	35,650
Structural Steel (13 lbs/sf)	21	TONS	3,500.00	73,500
Metal Roof Deck	3,100	SF	3.00	9,300
Exterior Wall Assembly	2,750	SF	50.00	137,500
Windows, Storefront, CW	1,960	SF	85.00	166,600
Roofing - pvc and flashing	3,100	SF	24.00	74,400
Interior Construction	3,100	SF	25.00	77,500
Interior Finishes	3,100	SF	24.00	74,400
Sprinkler system	3,100	SF	4.00	12,400
Plumbing	3,100	SF	8.00	24,800
HVAC	3,100	SF	15.00	46,500
Electrical	3,100	SF	26.00	80,600
Furnishings and Equipment	3,100	SF	7.00	21,700
Tie into existing structure and patch	1	LS	30,000.00	30,000

SUBTOTAL				962,350
GENERAL CONDITIONS/REQUIREMENTS		8 %		76,988
SUBTOTAL				1,039,338
CONTRACTOR PROFIT		3 %		31,180
SUBTOTAL				1,070,518
PERMIT, BOND & INSURANCE		2.5 %		26,763
SUBTOTAL				1,097,281
DESIGN CONTINGENCY		15 %		164,592

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
SUBTOTAL				1,261,873
ESCALATION (summer 2015)		5 %		63,094
TOTAL CAFETERIA ADDITION				1,324,967
KITCHEN RENOVATION				
Interior Demolition	7,450	SF	10.00	74,500
Remove and Replace slab at plumbing	4,000	SF	15.00	60,000
Interior Construction	7,450	SF	10.00	74,500
Interior Finish	7,450	SF	34.00	253,300
Kitchen equipment	1	LS	400,000.00	400,000
Sprinkler system	7,450	SF	4.00	29,800
Plumbing	7,450	SF	18.00	134,100
HVAC	7,450	SF	20.00	149,000
Electrical	7,450	SF	26.00	193,700
SUBTOTAL				1,368,900
GENERAL CONDITIONS/REQUIREMENTS		8 %		109,512
SUBTOTAL				1,478,412
CONTRACTOR PROFIT		3 %		44,352
SUBTOTAL				1,522,764
PERMIT, BOND & INSURANCE		2.5 %		38,069
SUBTOTAL				1,560,833
DESIGN CONTINGENCY		15 %		234,125
SUBTOTAL				1,794,958
ESCALATION (summer 2015)		5 %		89,748
TOTAL KITCHEN RENOVATION				1,884,706

CAFETERIA RENOVATION

Interior Demolition	9,377	SF	10.00	93,770
Interior Construction	9,377	SF	10.00	93,770
Interior Finish	9,377	SF	34.00	318,818
Sprinkler system	9,377	SF	4.00	37,508
Plumbing	9,377	SF	18.00	168,786
HVAC	9,377	SF	20.00	187,540
Electrical	9,377	SF	26.00	243,802
Furnishings and Equipment	9,377	SF	12.00	112,524
SUBTOTAL				1,256,518
GENERAL CONDITIONS/REQUIREMENTS		8 %		100,521
SUBTOTAL				1,357,039
CONTRACTOR PROFIT		3 %		40,711

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
SUBTOTAL				1,397,751
PERMIT, BOND & INSURANCE		2.5 %		34,944
SUBTOTAL				1,432,694
DESIGN CONTINGENCY		15 %		214,904
SUBTOTAL				1,647,599
ESCALATION (summer 2015)		5 %		82,380
TOTAL CAFETERIA RENOVATION				1,729,978
SITEWORK:				
General Site Prep	1	LS	10,000.00	10,000
Erosion control	500	LF	3.85	1,925
Construction fence	800	LF	9.75	7,800
Construction entrance - allow	1	EA	7,500.00	7,500
Remove selective plaza area	6,000	SF	8.00	48,000
Remove utilities	1	LS	5,000.00	5,000
Misc. Site Demolition	1	LS	10,000.00	10,000
Paving and Surfacing:				
Rebuild plaza and step	6,000	SF	30.00	180,000
Replace stair structures	2	EA	8,500.00	17,000
Site Improvements:				
Misc. Site furnishings	1	LS	15,000.00	15,000
Landscaping:				
Restore front lawn	1	LS	10,000.00	10,000
Mulch/Planting - allowance	1	LS	20,000.00	20,000
Sanitary:				
Relocate drain line	250	LF	85.00	21,250
Tie into existing	2	LOC	1,000.00	2,000
Drainage:				
Rework plaza drainage	1	LS	15,000.00	15,000
Drain Lines:				
Relocate drain line	250	LF	75.00	18,750
Tie into existing	2	LOC	1,000.00	2,000
Site Electric:				
Site lighting	1	LS	10,000.00	10,000
SUBTOTAL				401,225
GENERAL CONDITIONS/REQUIREMENTS		8 %		32,098
SUBTOTAL				433,323
CONTRACTOR PROFIT		3 %		13,000

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
SUBTOTAL				446,323
PERMIT, BOND & INSURANCE		2.5 %		11,158
SUBTOTAL				457,481
DESIGN CONTINGENCY		15 %		68,622
SUBTOTAL				526,103
ESCALATION (summer 2015)		5 %		26,305
TOTAL CAFETERIA SITEWORK				552,408
MEDIA CENTER RENOVATION				
Interior Demolition	10,790	SF	6.00	64,740
Interior Construction	10,790	SF	5.00	53,950
Interior Finish	10,790	SF	20.00	215,800
Sprinkler system	10,790	SF	4.00	43,160
Plumbing	10,790	SF	18.00	194,220
HVAC - rework distribution	10,790	SF	15.00	161,850
Electrical	10,790	SF	20.00	215,800
Furnishings and Equipment	10,790	SF	6.00	64,740
Skylight:				
Remove Concrete roof deck	1,500	SF	14.00	21,000
Reframe new opening (12 lbs/sf)	9	TONS	3,800.00	34,200
Aluminum Frame skylight	1,500	SF	130.00	195,000
SUBTOTAL				1,264,460
GENERAL CONDITIONS/REQUIREMENTS		8 %		101,157
SUBTOTAL				1,365,617
CONTRACTOR PROFIT		3 %		40,969
SUBTOTAL				1,406,585
PERMIT, BOND & INSURANCE		2.5 %		35,165
SUBTOTAL				1,441,750
DESIGN CONTINGENCY		15 %		216,262
SUBTOTAL				1,658,012
ESCALATION (summer 2015)		5 %		82,901
TOTAL MEDIA CENTER RENOVATION				1,740,913
AUDITORIUM OPERABLE PARTITION				
Remove Partition	105	LF	88.00	9,240
New 16' Operable Partition	1680	SF	105.00	176,400
Misc. Cut and patch	1	LS	10,000.00	10,000
SUBTOTAL				195,640

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
GENERAL CONDITIONS/REQUIREMENTS		8 %		15,651
SUBTOTAL				211,291
CONTRACTOR PROFIT		3 %		6,339
SUBTOTAL				217,630
PERMIT, BOND & INSURANCE		2.5 %		5,441
SUBTOTAL				223,071
DESIGN CONTINGENCY		15 %		33,461
SUBTOTAL				256,531
ESCALATION (summer 2015)		5 %		12,827
TOTAL OPERABLE PARTITION				269,358
SPRINKLER AT EXISTING SCHOOL				
Cut and Patch as necessary	212,923	SF	4.00	851,692
New Sprinkler system	212,923	SF	4.25	904,923
SUBTOTAL				1,756,615
GENERAL CONDITIONS/REQUIREMENTS		8 %		140,529
SUBTOTAL				1,897,144
CONTRACTOR PROFIT		3 %		56,914
SUBTOTAL				1,954,058
PERMIT, BOND & INSURANCE		2.5 %		48,851
SUBTOTAL				2,002,910
DESIGN CONTINGENCY		15 %		300,436
SUBTOTAL				2,303,346
ESCALATION (summer 2015)		5 %		115,167
TOTAL SPRINKLER AT EXISTING				2,418,513